FORESTRY ABSTRACTS

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NOTE ON FORESTS AND FORESTRY IN THE U.S.S.R.

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THE U.S.S.R. has over 900 million ha. of forest land, of which about two-thirds is wooded. Over two-thirds of the forests are coniferous. Thus the U.S.S.R. may be said to control a greater forest resource than any other country in the world.

It is known that about 90 per cent. of the world demand for wood is supplied from the forests of the cold and temperate zones, and it is in these zones that the principal forest regions of the U.S.S.R. are situated. In the northern forests of the Taiga there is a preponderance of conifers, while in the south, the west, and the far east there are also valuable deciduous forests. Pine, Spruce, Siberian and Dahurian Larch, Cembran Pine from Siberia and the far east, Oak, Alder, and Aspen provide the kinds of timber most often used in the U.S.S.R., and for which there is usually a demand from abroad.

Among other, less common trees that yield valuable timber, the following may be mentioned. In the Caucasus the Caucasus Fir (*Abies nordmanniana*) is the most important tree from an economic point of view. In addition, there are about 2 million ha. of Beech forest. The Yew and the Box Tree have survived there as well. In the far east, the Manchurian Ash (*Fraxinus mandshurica*), the Cork Tree (*Phellodendron amurense*) and *Betula schmidtii* are the most valuable deciduous trees. The wood of *B. schmidtii* possesses remarkable mechanical properties; its bending strength is three and a half times as great as that of Oak and greater than that of pig iron. In Central Asia are found the Yezo Spruce, the Walnut, which furnishes most valuable aircraft timber, a tree-like Juniper, the wood of which is used in pencil manufacture, and *Haloxylon ammodendron*, which yields firewood of very great heating power.

Since the days of Ivan the Terrible, Russian Pine (*P. sylvestris*) timber has been famous for its eminent suitability as a building material for houses and ships. In recent times, however, Fir, Larch, and Cembran Pine have been used increasingly, together with *P. sylvestris*, for the building of dwelling houses. Larch timber structures are very durable—they have been known to last for over 600 years without weathering or rotting. Siberian Larch from the Krasnoyarsk region of eastern Siberia and Dahurian Larch from the Yakutsk and the far eastern regions surpass Oak of the highest quality in compression and bending strength and are inferior to it only in hardness and shearing strength. Owing to climatic conditions, the volume per ha. of pure Larch stands is much smaller than that of Oak. On the other hand, Larch forests occupy a greater area (249 million ha.) in the U.S.S.R. than any other type of forest. Indeed, the Larch-forest acreage of the U.S.S.R. is comparable to the total forest acreage of so richly wooded a country as Canada.

The best Oak forests of the U.S.S.R. are found in White Russia and in the south-west of the Ukraine. The Oaks of these regions are in no way inferior in quality to those of Slavonia, France, the Spessart, and the Central United States. There are also good Oak forests in Tartary, the Choovash Autonomous Republic, and in the region of Voronezh.

The excellent qualities of Spruce as a pulpwood tree are well known. Only two countries possess very extensive Spruce forests—the U.S.S.R. and Canada. But the U.S.S.R. has a considerably greater Spruce acreage than Canada. The forests of the U.S.S.R. in which Spruce is the dominant species cover some 68 million ha., and Spruce is also strongly represented in mixed forests in which it is not the principal species.

Aspen is considered nowadays the most suitable tree species for the manufacture of matches. Before the war of 1914–18 Sweden produced daily one match per head of the population of the world. But at that time, as at present, Sweden had meagre Aspen reserves and had therefore to draw on

Russian Aspen, which was exported to most European countries as well as to China and South America. In 1913 Russia produced 3,750,000 cases, each containing one thousand boxes of matches; in 1939 the production amounted to 9,500,000 such cases.

The U.S.S.R. obtains a great number of chemical products from wood, including acetic acid, methyl alcohol, wood sugar, artificial camphor, tanning materials, turpentine, creosote, guajacol, and cellulose wadding. At present Pine resin is produced not only in the Ukraine, in White Russia, and along the Volga, but also in the north of the European part of the U.S.S.R., in the Chelyabinsk region, and in western Siberia.

The principal tasks of forestry in the U.S.S.R. include the adjustment of forest distribution in the sense of extending agricultural cultivation in the north of the country while enlarging the forest area in the more sparsely wooded southern districts, increased cultivation of fast-growing species, and the introduction of valuable trees to new regions—e.g. the acclimatization in the European part of the Union of the Cork Tree, the Manchurian Walnut, and the Ash from the far east, and of the Siberian and northern Asiatic Poplars. In addition to such redistribution of inland tree species, Soviet foresters strive to enrich the forest flora of the Union with exotic trees. Although Black Locust was introduced into Russia some 150 years ago, in general the cultivation of exotics did not develop before 1917. At present Australian Eucalypts are grown in Transcaucasia, and their number will soon reach 16 million. In the Ukraine, the introduction of different American Ash species and of Catalpas, Canadian Poplars, and Tulip Trees is proceeding on a large scale.

Special water-protection forests have been created to protect the old waterways that are now being repaired, as well as the new canal systems. The acreage of these forests approximately equals that of the entire forest area of the central and southern European countries. During 1927–38 over a million ha. were afforested for the purpose of waterway protection. In 1938 alone the Chief Protection Forest Administration created 232,680 ha. of plantations. Management of the protection forests is based principally on the group-selection system, and clear cutting, if any, is carried out in narrow strips.

Among measures for raising the yield of field crops, 'zonal' forestation (shelterbelt planting, etc.) occupies an important place. There were over 200,000 ha. of plantations of this kind in 1937.

In old Russia forest utilization was characterized by excessive felling in sparsely wooded districts and in 1- to 5-km.-wide strips along floatable rivers, while overmature stands accumulated in the less accessible regions. At present, however, concentrated fellings combined with mechanized extraction and transportation allow of utilizing the enormous forest wealth that had previously lain fallow, while aerial surveying renders considerable help in planning such exploitation. In the winter of 1939–40 the total volume of timber exploited in the Taiga amounted to about 69 million cu.m., of which 38 per cent. was extracted by means of motorized vehicles. Tractors, lorries, and narrow-gauge railways accounted, respectively, for 59, 26, and 12 per cent. of the volume of mechanically extracted timber. The mechanization of logging improves with every year. In 1942 extraction by rail is to be expanded, while tractor extraction along frozen trails, the condition of which depends on the vagaries of the weather, is to become relatively less important. It is also planned to make increased use of gas-producer plants in forestry work.

During 1932 to 1937 timber was the principal export commodity, in terms of money, of the U.S.S.R., when it accounted for about one-quarter of the total value of the exports. About two-thirds of the timber exported is in the form of sawn material.

At present, the U.S.S.R. possesses 10 forestry schools of university rank and 40 technical colleges for foresters. The Leningrad Forest Academy has five faculties, employs 300 professors and lecturers, and has an enrolment of about 2,800 students. However, owing to the rapid development of the forest industry, the demand for trained men is so great that the forestry schools are still unable to keep pace with it. For this reason the regular instruction given to internal students is supplemented by a great variety of special forestry courses, including tuition by correspondence for external students having practical experience in forestry.

ABSTRACT SECTION

NOTE.—A capital letter in square brackets following the reference denotes the language in which the paper is written. A small letter denotes a summary in another or the same language, e.g. [G.e.]—German, with English summary. English [E.] is only indicated for papers published in journals usually written in foreign languages.

The term "billion" used in papers originating in North America means a thousand million.

0. GENERAL FORESTRY

01. TRADE NAMES OF TIMBERS. BIBLIOGRAPHY

01.2 (94). **Nomenclature of Australian timbers.** *Tr. Circ. Coun. sci. industr. Res. Aust.* No. 47, 1940. pp 84.

The three parts of this publication contain: (1) Alphabetical list of standard trade common names together with corresponding standard trade reference names, botanical names and the State in which the tree occurs. (2) Alphabetical index of botanical names with corresponding standard trade reference names and common names. (3) Alphabetical index of common or local names with corresponding standard trade common names and standard trade reference names.

01.6 (560). HAFNER, F. Schrifttumsnachweis über die türkische Forstwirtschaft und deren Grundlagen unter Berücksichtigung der Jagd und Süsswasserfischerei. **[Bibliography of Turkish forestry and its fundamentals, including references on game and freshwater fisheries.]** *Suppl.* to *Cbl. gesamte Forstw.* 67 (5/6), 1941. pp. 33. [G.]

01.6 (79.5 : 79.7). **Pacific Northwest Forest and Range Experiment Station: List of publications available for distribution and including complete lists of those publications of this Station now being continued as a numbered series.** Portland, Oregon. 1941. pp. 16.

02. LISTS OF VERNACULAR NAMES

02.41 (71). Nomenclature des arbres du Canada. **[Nomenclature of the trees of Canada.]** Ministère des Terres et Forêts, de la Chasse et de la Pêche, Quebec. pp. 21.

A list of Canadian trees, giving the French, English and botanical names and divided into three sections so that each group of names has the key position in turn.

03. OTHER SELF-CONTAINED GENERAL WORKS

03. STEVENS, S. R. **Trees.** Cecil Baugh and Co., Dallas. 1940. pp. xiii + 201. Biol. Abs. 15 (13459).

A lumberman's book of trees, with chapters on tree growth and distribution, history of the saw and sawmilling, shrinkage of lumber, grading of lumber, sign language used in sawmills, good lumber and good construction, useful tree species, famous trees, reforestation, forest fires, forests as a defence against erosion, and a collection of curious facts about trees.

05.3. *Annual Reports*

05.3 (410). GREAT BRITAIN. **Annual report (twenty-seventh year) 1939, East Malling Research Station, near Maidstone, Kent.** 1940. pp. 88. With 'Supplementary annual report (twenty-seventh year): General development and activities'. 1940. pp. 18.

05.3 (54.8). COORG. **Progress report of the Forest Administration in Coorg for 1939-40.** Mysore Residency Press, Bangalore. 1941. pp. 50.

05.3 (59.1). BURMA. **Report on forest administration in Burma (excluding the Federated Shan States) for the year ending 31st March, 1940.** Supt., Govt. Printing and Stationery, Rangoon. 1941. pp. 176.

05.3 (59.1) : 91.1. BURMA. **Annual report on game preservation in Burma (including a note as to the position in the Federated Shan States) for the year ending 31st March, 1940.** Supt., Govt. Printing and Stationery, Rangoon. 1941. pp. 26.

05.3 (67.6). UGANDA. **Annual report of the Forest Department for the year ended 31st December, 1940.** Govt. Printer, Entebbe. 1941. pp. 8.

05.3 (68.1). BECHUANALAND PROTECTORATE. **Annual report of the Forest Officer, Bechuanaland Protectorate Government, for the year ended 31st December, 1940.** Typescript. [1941.] pp. 2.

05.3 (71) : 2 : 31 : 33 : 43 : 44.3 : 98. CANADA. **Report of the Lands, Parks and Forests Branch for the fiscal year ended March 31, 1940.** *Repr.* from the Annual Report of the Department of Mines and Resources, pp. 60–135. King's Printer, Ottawa, 1941.

05.3 (71.1). BRITISH COLUMBIA. **Report of the Forest Branch for the year ended December 31st, 1940.** King's Printer, Victoria, B.C. 1941. pp. 101.

05.3 (71.3). ONTARIO. **Report of the Minister of Lands and Forests of the Province of Ontario for the fiscal year ending March 31st, 1940.** King's Printer, Toronto. 1941. pp. 157.

05.3 (729.2). JAMAICA. **Report of Conservator of Forests, January 1st, 1939 to March 31st, 1940.** [Govt. Printer, Kingston. 1940?.] pp. 7.

05.3 (73) : 45.3 : 44.3. UNITED STATES. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1940.** Superintendent of Documents, Washington, D.C., 1940. pp. 128.

05.3 (74.3). VERMONT. **Agricultural Experiment Station. Fifty-third annual report, 1939-1940.** *Bull. Vt. agric. Exp. Sta.* No. 463, 1940. pp. 31.

05.3 (74.7). STATE OF NEW YORK. **Conservation Department. Thirtieth annual report, for the year 1940.** *State of New York Legislative Document* (1941) No. 38. pp. 402.

05.3 (76.3 : 75.8–76.6). UNITED STATES. **Twentieth annual report of the Southern Forest Experiment Station, January 1, 1940–December 31, 1940.** New Orleans, La. [1941.] pp. 39.

05.3 (77.5) : 23.26 : 11.47.1 : 44.3. **What's new in farm science. Part 2: Annual report of the Director, Agricultural Experiment Station, University of Wisconsin, Madison.** *Bull. Wis. agric. Exp. Sta.* No. 449, 1940. pp. 96.

05.3 (88.1). BRITISH GUIANA. **Report on the Forest Department for the year 1939.** Govt. Printer, Georgetown, Demerara. 1941. pp. 9.

05.3 (91.1). SARAWAK. **Annual report on the Forest Department for the year 1940.** Govt. Printer, Kuching. 1941. pp. 13.

05.3 (932–9). FIJI. **Forest Department. (Annual report for 1940.)** Legislative Council. *Council Paper*, No. 3, 1941. pp. 4.

05.3 (94) : 07.2 : 3. AUSTRALIA. **Fourteenth annual report of the Council for Scientific and Industrial Research for year 1939-40.** Govt. Printer, Canberra. 1940. pp. 102.

05.3 (942). SOUTH AUSTRALIA. **Woods and Forests Department. Annual report for the year ended 30th June, 1940.** Govt. Printer, Adelaide. 1940. pp. 16.

05.3 (944). NEW SOUTH WALES. **Forestry Commission (Report for the year ended 30th June, 1940).** Govt. Printer, Sydney. 1941. pp. 8.

09.1. *Forest History*

09.1 (494) : 12.19 : 12.26–8. MEYER, K. A. Holzartenwechsel und frühere Verbreitung der Eiche in der Westschweiz. **[Changes in tree species and the former distribution of Oak in western Switzerland.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 21, 1940 (349–420). [G.g.f.]

09.1 (54). MOBBS, E. C. **The early history of Indian forests.** *Indian For.* 67, 1941 (231–42).

Notes on the history of Indian forests from the earliest records through the Bráhman and Buddhist periods, the period of Alexander the Great, the Mauryan Empire, the post-Mauryan period and the Mogul Empire, up to and including the period of early British rule.

09.2. *Pre-history*

09.2. BARGHOORN, E. S., and BAILEY, I. W. **A useful method for the study of pollen in peat.** *Ecology* 21, 1940 (513–4). [Harvard University, Cambridge, Mass.]

The technique described consists principally in treating the peat repeatedly and alternately with saturated chlorine water and hot 4-percent. sodium sulphite solution, centrifuging the sample between each treatment. This process simultaneously deflocculates and bleaches the peat and concentrates the pollen by removing a large fraction of the organic substances.

09.2 (410). GODWIN, H. **Pollen analysis and forest history of England and Wales.**

New Phytol. 39, 1940 (370–400). [Botany School, Cambridge.] O.B.D.

From a review of the evidence available from sites distributed over England and Wales it appears that a pollen zonation established in the East Anglian Fenland is applicable to the whole country. This reveals a strong regional differentiation that corresponds with present-day differences: in each part of England and Wales the forest history has followed an equivalent but not identical course. The successive zones have been distinguished as follows:—VIII: Alder/ Oak/Elm/Birch/(Beech) zone. VII: Alder/Oak/Elm/Lime zone. VI: Pine/Hazel zone. V: Pine zone. IV: Birch/ Pine zone. The correlation of these zones with archaeological horizons in the Fenland can be consistently extended to the rest of England and Wales, although everywhere the Bronze and Iron Age correlations call for more detailed analysis. The correlations with the stratigraphic indices of peat deposits and lakes indicate the possibilities rather than the achievements of the method. It seems certain that pollen analysis will be of particular value in investigations of submerged peat beds, and there is already strong indication of the rapid marine transgression that formed the North Sea having been in progress during zone VI, the Boreal period. *From author's summary.*

09.2 (75.1). PENNY, J. S. **Upper cretaceous wood from eastern Delaware.** *Abstr.* in *Amer. J. Bot.* 27, 10, 1940 (11s). [University of Pennsylvania, Philadelphia.] O.B.D.

Tons of fossil wood from upper cretaceous strata have been uncovered during dredging operations along the Delaware-Chesapeake canal. All of the specimens so far examined have proved to be coniferous; a third are of the *Pityoxylon* (*Pinoxylon*) type, a third of the *Araucarioxylon* type, and the rest mainly *Brachyoxylon* with some *Cedroxylon.*

09.2 (75.2). BERRY, E. W. **Notes on the Pleistocene of Maryland.** *J. Wash. Acad. Sci.* 31, 1941 (28–32). [John Hopkins University.] L.S.

Remains of tree species found in the Pleistocene deposits of Maryland include species of *Quercus, Fagus americana, Hicoria ovata, Alnus rugosa, Pinus virginiana, Taxodium distichum,* and *Tsuga canadensis.*

09.2 (77.1 : 71.3) : 11.2. WILSON, L. R. **Microfossil studies in Quaternary peats of Ohio and Ontario.** *Abstr.* in *Amer. J. Bot.* 27, 10, 1940 (12s). [Coe College, Cedar Rapids, Iowa.] O.B.D.

Statistical study of the fossils suggests a definitely northward forest migration during the Pleistocene. The succession has been Spruce/ Pine, Pine, Oak/Hickory, Beech/Maple in the deciduous forests of central Ohio, and Spruce, Pine, hardwoods in the Hemlock/hardwood forest of northern Ohio and southern Ontario. In the boreal forests of Ontario Spruce has predominated, with a suggestion of Pine and some hardwoods near the top of the deposits. There appears to be evidence for a xerothermic period at a date as recent as 3,000 years ago.

09.2 (78.8). STEWART, B. K. **Ecological comparisons of Tertiary and present-day vegetation in the Creede Valley, Colorado.** *Abstr.* in *Amer. J. Bot.* 27, 10, 1940 (11s). Waynesburg College, Waynesburg, Pa.] O.B.D.

Evidence from the fossil flora indicates that dry grasslands, chaparral, middle-elevation and high-mountain forests, comparable in composition to those of to-day, existed in this valley during late Tertiary times.

09.2 (78 : 79) : 11.2. AXELROD, D. I. **Historical development of the woodland climax in western North America.** *Abstr.* in *Amer. J. Bot.* 27, 10, 1940 (21s). [U.S. National Museum, Washington, D.C.] O.B.D.

As a result of the trend towards aridity in later Tertiary times there was a northward migration of members of the woodland formation that previously covered the southwestern United States and northern Mexico. Decreasing annual precipitation, a change in rainfall distribution, and greater extremes of winter temperature segregated the woodland during post-lower-Pliocene times into the three modern associations—the Oak/Juniper of the southwestern United States, the Pinon/Juniper of the Great Basin, and the Digger Pine of California. During the late Cenozoic more xeric communities became climax over large areas formerly dominated by woodland.

09.2 (79.7) : 11.2. HANSEN, H. P. **Further pollen studies of post Pleistocene bogs in the Puget lowland of Washington.** *Bull. Torrey bot. Cl.* 68, 1941 (133–48). [Oregon State College, Corvallis.] O.B.D.

Pollen analysis of two further post-Vashon bogs in the Puget Sound basin confirms the forest succession indicated by previous data [*For. Abs.* 2 (109, 182)]. The pioneer forests consisted mainly of *Pinus contorta* and *P.*

monticola, which were replaced rather abruptly by *Pseudotsuga taxifolia*, followed by a more gradual increase of *Tsuga heterophylla*. In one case *T. heterophylla* eventually superseded *P. taxifolia* and has maintained its predominance; in the other the two species have remained generally in about equal proportions. Though succession in the region is largely controlled by non-climatic factors, it is believed that there have been several slight climatic trends. The initial climate was perhaps cooler and drier than the present humid, microthermal type.

09.4. *Forest Statistics*

09.4 (47.4). Morozov, A. V. **The forests and forest industry of Latvia, Estonia, and Lithuania.** *Lesnaya Industriya* 1940 (10/11), (28–31). [R.]

09.4 (485) : 33.06. Vedavverkningen ökas till 35 à 40 milj. kbm. [**Fuelwood fellings to be increased to 35–40 million cu. m.**] *Skogen* 28, 1941 (95). [Sw.] L.S.

Sixty-one per cent. of the proposed fuelwood cut for 1940–41 (30 mill. cu. m. stacked measure) had been felled by 1st February, and there are good prospects for the completion of the felling programme by the end of the season. In the coming season it is planned to extend the cut to 35–40 mill. cu. m., and it is possible that some form of compulsion may be necessary to attain this high figure. The Fuel Commission is arranging for considerable State reserves of fuelwood for the coming winter.

09.4 (485) : 33.06 : 98.1. Billberg, A. Vår bränsleförsörjning i nuvarande läge. [**Our fuel supply in the present situation.**] *Svenska SkogsvFören. Tidskr.* 38, 1940 (261–83). [Sw.]

A comprehensive review is made of the fuel situation in Sweden as affected by wartime conditions, particularly those that have arisen since the total blockading of the country from the west. Domestic resources of solid fuels, comprising coal, shale, wood, and peat, and the possibilities of developing home production of liquid fuels, are discussed. It is concluded that at present, and probably for some time to come, fuels other than wood and charcoal can play only a minor part, and except for other fuels indispensable for special purposes the bulk of the supply must be derived from the forests. Preliminary government measures to safeguard the fuel supply included the creation of loans to help defray logging costs, the fixing of a state-guaranteed price for wood not disposed of to other buyers, and an order requiring owners to furnish monthly returns of the fuelwood cut on their lands. As these measures did not stimulate production on a sufficiently large scale, a law was passed in March, 1940, whereby fuelwood fellings became obligatory, though actual compulsion has so far proved unnecessary. The production, marketing, and distribution of all fuels is now under the supervision and direction of a special Fuel Commission appointed by the Government, and a system of rationing is being introduced that will apply to all fuel consumers. The Fuel Commission has estimated that the complete substitution of wood for other fuels wherever possible would entail an annual fuelwood cut of about 50 million cu. m. solid measure. This would be only about 8 million cu. m. short of the total annual increment for the country, the normal saw-timber and pulpwood cut of which exceeds 30 million cu. m. By making allowance, however, for such imported fuel as can be obtained, for home production of other fuels, and for the effects of rationing, the Commission has fixed the fellings of fuelwood for 1940–41—including the part of the pulpwood cut that is obligatory and must be held for fuelwood unless otherwise directed—at 30 million cu. m. stacked, or about 19·5 million cu. m. solid measure. Adding to this the 8 million cu. m. that are expected to be cut by owners for their personal use the total fuelwood cut should amount to some 27·5 million cu. m. solid measure. [Cf. also *For. Abs.* 2 (317, 335); 3 (17, 58)]

09.4 (485) : 33.38.3. Träkolsförbrukningen vid järnverken 1939. [**Charcoal consumption in the iron industry, 1939.**] *Skogen* 28, 1941 (108). [Sw.] L.S.

The total charcoal consumption of iron works in Sweden amounted to 18,893,000 hl. in 1939 as against 20,700,000 hl. and 19,300,000 hl. in 1938 and 1937 respectively. Imports of charcoal, 92 per cent. of which came from Finland, amounted to 437,000 hl. as against 501,000 hl. in the previous year.

09.4 (497) : 09.7. Michelangeli, M. Il problema forestale albanese. [**Forest problems of Albania.**] *Riv. for. ital.* 2, 1940 (441–58). [It.] Biol. Abs. 15 (11269).

Albania has about 500,000 ha. of forest and about 400,000 ha. of unproductive land suitable

for forestry. Owing to the mountainous topography and heavy precipitation, and the small proportion of arable land, maintenance of forest cover in catchment areas is extremely important. Restriction of cutting and grazing, pasture improvement, and reforestation are urgently needed.

09.4 (52). CROFT, C. M. **Lumber situation in Japan.** *B. C. Lumberm.* 25 (7), 1941 (61).

A recently enacted Lumber Control Law gives the administrative authorities a wide measure of control over the whole of the lumber industry. Statistics are given showing the acreage of woodlands cleared and afforested in 1935–39 inclusive, the total imports and exports of 1940, and the main uses to which the 1940 domestic consumption of 918,560,000 cu. ft. was put.

09.4 (54) : 76 : 8. INDIA. **Annual return of statistics relating to forest administration in British India for the year 1938-9 (with which is incorporated the Quinquennial Review, ending 31st March, 1939).** Manager of Publications, Delhi. 1941. pp. 56.

09.4 (71). CANADA. **Estimate of forest production. Operations in the woods in Canada, 1939.** Dominion Bureau of Statistics, Ottawa. 1941. pp. 10. [E.F.]

The estimated or reported total production, consumption, exports and imports of each of the principal wood products is tabulated together with its equivalent in volume of standing timber and its value. Forest production in terms of standing timber and value is also recorded for each province and figures are given for the value of each of the principal products for 1939 and the preceding four years.

09.4 (71). **Estimate for Canadian forest production for 1939.** *B. C. Lumberm.* 25 (6), 1941 (48, 50).

09.4 (71) : 33 : 98.1. CANADA. **The miscellaneous wood-using industries, 1939.** Dominion Bureau of Statistics, Ottawa. 1941. pp. 4. [E.F.]

The principal statistics for 1938 and 1939 are given for establishments engaged in wood preservation and the manufacture of products such as match blocks, wooden tanks and conduits, perambulators, toy vehicles, etc.

09.4 (71.4) : 98.1 : 33.17 : 12.25. Producteurs de Pin Blanc et de Pin Rouge du Québec. **[Producers of White and Red Pine [lumber] in Quebec.]** Office des Produits Forestiers, Ministère des Terres et Forêts, de la Chasse et de la Pêche, Québec. 1940. pp. 8.

09.4 (73) : 94.11. **National Forest areas.** Forest Service, U.S. Department of Agriculture, Washington, D.C. 1940. pp. 15.

In the United States in 1940. The data are summarized in the following table:—

Unit	*Number of Units*	*Gross Area*	*Area not under Forest Service administration*	*Area under Forest Service administration*		
				Acquired	*Approved for acquisition but unacquired*	*Total*
		Acres	*Acres*	*Acres*	*Acres*	*Acres*
United States . . .	—	228,173,676	51,394,299	175,584,048	1,195,329	176,779,377
National forests . . .	160	218,680,215	42,956,811	174,769,543	953,861	175,723,404
Purchase units . . .	34	8,521,243	7,993,879	299,660	227,704	527,364
Experimental areas . .	14	335,247	18,920	315,884	443	316,327
Land utilization areas . .	—	636,971	424,689	198,961	13,321	212,282

09.4 (74) : 33.4. **Preliminary report on the lumber industry in Canada, 1939.** *B. C. Lumberm.* 25 (7), 1941 (28–9).

The 1939 figures show increases over those of 1938 for all products except slabs and edgings and show an increase of 5·2 per cent. in volume of production and of 7·3 per cent. in value. The total production for 1939 was nearly 4 billion bd. ft. The principal statistics are tabulated.

09.4 (75 : 76 : 77 : 78). REYNOLDS, R. V., and PIERSON, A. H. **Forest products statistics of the Central and Prairie States.** *Statist. Bull. U.S. Dep. Agric.* No. 73, 1941. pp. 94. [U.S. Forest Service.]

Statistics for lumber production, distribution, consumption and prices, paper production, veneer production, stumpage prices, lumber-log prices and estimated fuelwood consumption.

09.4 (78.6 : 79.6) : 98.1 : 33.4. WHITNEY, C. N. **Production of lumber, lath, and shingles in Idaho and Montana, 1940.** *Res. Note Nth. Rocky Mt. For. & Range Exp. Sta.* No. 14, 1941. pp. 3.

09.4 (79.5). MORAVETS, F. L. **Forests of the Willamette: the resource.** *W. Cst. Lumberm.* 68 (6), 1941 (26, 28). [Pacific Northwest Forest & Range Exp. Sta.]

The Willamette River unit, one of the greatest concentrations of virgin timber left in the United States, is situated in western Oregon. It has a total land area of 6,209,000 acres, of which 70 per cent. has been classified as forest land, and a total saw-timber volume of 104 billion bd. ft. (1933 inventory) distributed over 60 per cent. of the area's forest land. Douglas Fir is predominant on 82 per cent. of the stocked forest land and Western Hemlock and Western Red Cedar are the principal minor components of such stands. Quality-class distribution includes 806,000 acres of old-growth Douglas Fir in which much of the merchantable volume is in trees 40 in. d.b.h. and over, 835,000 acres of old-growth Douglas Fir largely in trees 20–40 in. d.b.h., 615,000 acres of second-growth Douglas Fir in which timber is from 20–40 in. d.b.h., some 360,000 acres of saw-timber stands composed of mixtures of Western Hemlock, Noble Fir, Pacific Silver Fir, Mountain Hemlock, Western White Pine, and Alaska Yellow Cedar, and 1,050,000 acres of conifer second growth of less than saw-timber size. The current annual growth on conifers 15·1 in. d.b.h. and over is estimated at 422 million bd. ft. while that on hardwood trees 11·1 in d.b.h. and over is estimated at 5 million bd. ft.

09.4 (79.5 : 79.7) : 12.19.2 : 12.25. ANDREWS, H. J., and COWLIN, R. W. **Forest resources of the Douglas-Fir region.** *Misc. Publ. U.S. Dep. Agric.* No. 389, 1940. pp. 169 + maps. [Pacific Northwest Forest & Range Exp. Sta.]

The major report on the findings of the forest survey in the region. The principal divisions of the report are concerned with methods and specifications of the survey, forest inventory, depletion, forest growth, forest protection, land use, forest industries, future timber supplies in relation to industrial development, forest-land management problems, and a regional forest programme.

09.4 (79.6) : 09.7. HUTCHISON, S. B., and WINTERS, R. K. **Northern Idaho's forest problem—1941.** *For. Surv. Release Nth. Rocky Mt. For. & Range Exp. Sta.* No. 19, 1941. pp. 24.

Popular account of the position of forestry and forest industry in Idaho, with recommendations bearing on forest policy.

09.7. *Monographs of Individual Forest Regions*

09.7 (43.1–5 : 44) : 11.2 : 11.4 : 12.19.2. ALBRECHT, F. Zu den Grundlagen forstlicher Arbeiten in den Oberrheinlanden. **[On the (natural) foundations of forestry work in the Upper Rhine lands.]** *Allg. Forst- u. Jagdztg.* 117, 1941 (153–66). [G.]

A discussion of climate, soils and forest regions.

09.7 (498). FRÖHLICH, J. Das Kelemengebirge. **[The Kelemen range.]** *Cbl. gesamte Forstw.* 67, 1941 (89–95). [G.]

A note on the forests of this range and on their management.

09.7 (54.1) : 07.8 : 86. HOWARD, S. H. **Note on a tour of inspection in the forests of the Andaman Islands.** Govt. of India Press, Simla. 1941. pp. 17.

Past policy and management of the Andamans forests are discussed briefly. It is pointed out that with recent improvements in transport facilities the whole forest area of the Andamans, some 1,500 sq. miles, now comes within the exploitation scheme. On rotations of 80 years for fast-growing and 150 years for slow-growing species the clear fellings and selection fellings together would produce a total of 136,000 tons per year compared with the present prescribed yield of 43,000 tons, and with adequate regeneration of cut-over areas the yield could be greatly increased. Present demand, transport facilities and sawmill capacity can be expanded quite easily to handle a yield of 75,000 tons.

The second part of the report discusses the revision of the working plan and details relating to the future management of the Andamans forests.

09.7 (66.4). MACGREGOR, W. D. **First impressions of forestry in Sierra Leone.** *Niger. For.* 1 (2), 1940 (20–1).

A brief discussion of forest conditions and of outstanding forest problems, which are noted as (*a*) the conservation and improvement of selected areas of secondary forest for local

supplies and incidentally to protect Semei (*Chlorophora excelsa*) from complete disappearance, (*b*) the rehabilitation of degraded areas by the introduction of indigenous species and by fire protection, thus encouraging natural succession, and (*c*) the protection of catchment areas.

09.7 (66.9). RUSSELL, G. W. **Forestry on the Plateau.** *Niger. For.* 1 (2), 1940 (11–5).

The Plateau in north central Nigeria lies at about 3,500 to 4,500 ft. elevation. Rainfall averages 50–60 in. In general, soils are of granitic origin and poor, a few exceptions occurring where basalt is the parent rock. While there was a considerable tree growth on the area originally, rapid deforestation followed the development of the mining industry and the increased demand for fuelwood, and local inhabitants now use manure, cornstalks and grass for fuel. A project for the improvement of forest conditions has now been approved and is being put into operation. Its three main features are (*a*) the reservation of forest land to ensure a supply of fuel to the principal markets, (*b*) communal plantations to provide village fuel requirements, and (*c*) the formation where possible of protection reserves. The development of these items is outlined. In addition, seedlings are being sold to individuals and mining companies.

09.7 (729.3) : 12.19.2 : 12.25. CHARDÓN, C. E. Los pinares de la Republica Dominicana. **[The Pine forests of the Dominican Republic.]** *Carib. For.* 2, 1941 (120–31). [Span. e.]

Notes on the distribution, ecology, and economic value of these forests, which cover an area of approximately 7,500 sq. km. in the mountainous interior of the country, and constitute the largest existing reserve of useful timber in the Antilles. It is suggested that this forest resource should be conserved and regulated with two objects in view with reference to the future economy of the country, namely to ensure the perpetuation of the forests and to ensure, by means of proper exploitation, a supply of construction timber for the local market. If in addition a certain amount of forest research could be undertaken, forestry in the Dominican Republic would be established on a permanent basis.

09.7 (83) : 12.19 : 09.4 : 98. ELCHIBEGOFF, I. M. **The forests, lumber industry, and timber trade of Chile.** *J. For.* 39, 1941 (357–61).

The Chilean forests lie between 36° and 40° of south latitude. The exploitable timber stands have been said to cover some 11 million acres or 29 per cent. of the total forest area, though other estimates are much lower. Important tree species include *Araucaria araucana*, *Fitzroya cupressoides*, *Nothofagus obliqua*, *N. procera*, *Drimys winteri*, *Laurelia aromatica* and *Persea lingue*.

A separate forest department has recently been established and forest education has received considerable attention. The lumber industry, concentrated in the southern part of the country, has grown rapidly in all branches during the last two decades, due largely to increased domestic consumption. In 1937–38, 398 sawmills with 504 saw tables and employing 9,640 workers produced 165 million bd. ft., more than half of which was produced by two large mills. Much of the logging and sawmilling is primitive and employs seasonal farm labour. Neither imports nor exports of lumber play an important part in Chilean economy, the high point for imports of 50 million bd. ft. in 1929 declining to 47 thousand bd. ft. in 1933, and the high point for exports being 21·4 million bd. ft. in 1938, about 1 per cent. of the value of mineral products in that year.

1. FUNDAMENTAL NATURAL LAWS OF THE FOREST

11.1. *Atmosphere*

11.14. Precipitations

11.14.3 : 11.62.3 : 91.3. BERNARDINI, F. L'azione della foresta sulle pioggie e sul regime delle acque. **[Effect of the forest on rainfall and streamflow.]** *Riv. for. ital.* 2, 1940 (475–80). [It.] Biol. Abs. 15 (10055).

11.15. Light

11.15 : 12.19.2 : 12.19.3. NÄGELI, W. Lichtmessungen im Freiland und in geschlossenen Altholzbeständen. **[Light measurements in the open and in closed stands of old timber.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 21, 1940 (250–306). [G.g.f.]

The measurements were carried out by

means of selenium cells. The amount of light, in per cent. of the light in the open, that penetrated to the level of the ground flora in the course of the vegetation period, decreased in a coniferous stand from 8 per cent. previous to the formation of the new annual shoots to 4 per cent. in autumn, and in a broadleaved stand from 51 per cent. previous to leafing to 5 per cent. just before the foliage was shed. A mixed coniferous/broadleaved stand occupied an intermediate position in this respect. In this and the broadleaved stand the diffused light available in the course of a day varied in proportion to the amount of diffused light in the open. On the other hand, the proportion of direct light, if any, that penetrated the stands in the course of a day was extremely variable. During about one-half of the vegetation period there was no direct light at all; during the other half, on an average, 40 to 70 per cent. of the light in the stands was diffused and the remainder direct.

11.17. Solid Particles in the Atmosphere

11.17 : 07.7 : 4. **Techniques for appraising air-borne populations of microorganisms, pollen, and insects.** *Phytopathology* 31, 1941 (201–25).

A report on apparatus and methods, compiled by the Committee on Apparatus in Aerobiology, U.S. National Research Council.

11.2. *Climate and Microclimate*

11.22 : 11.33 : 12.19.2. AIKMAN, J. M. **The effect of slope on climatic factors.** *Ia. St. Coll. J. Sci.* 15, 1941 (161–7). [Iowa Agricultural Exp. Sta.]

(i) Quantitative differences induced by variation in aspect of slope within a given geographic location in southern Iowa, are presented for climatic factors selected on the basis of their effect on plant growth. The north and south slopes were somewhat better protected by woody vegetation than the east and west slopes. (ii) Under the conditions of the experiment there seemed to be the greatest contrast in all factors between the east and west slopes. (iii) The west slope had the highest average air and soil temperature, the highest maximum soil temperature at 2 inches, the longest frost-free season, the highest evaporation, the greatest wind velocity, and, next to the north slope, the smallest number of alternate freezing and thawing periods. (iv) The west slope was the most xeric, with the other slopes ranking in the following order: south, east, and north. (v) On the basis of heat injury the slopes would rank, in order: west (greatest danger of injury), south, east, north. (vi) On the basis of cold injury alone the slopes would rank as follows: east (greatest danger of injury), south, north and west. *Author's summary.*

11.22 : 91.3 : 11.1. WARREN, W. D. M. **The influence of forests on climate.** *Indian For.* 67, 1941 (292–301).

It is maintained that forests have a considerable influence on local (micro)climate.

11.4. *Soil*

11.4 : 11.47 : 11.62.11. GUSTAFSON, A. F. **Soils and soil management.** McGraw-Hill Book Co., Inc., New York and London. 1941. pp. 424.

This is a practical text book written to supply the needs of a particular branch of the United States public. It is an agricultural work of limited use to foresters except in so far as it gives an interesting review of a sister subject. The chapters on soils as soils are elementary and though good are no better than most other elementary text books on the subject. In the chapters on water problems and erosion control the author is dealing with his own special subject and these are of great value to all soil workers. The rest of the book is a practical farmers' tutor and deals with crops, husbandry and manuring in great detail but specifically for the systems of agriculture as practised in the United States. The book is well planned and written so that it is very easy to read, while interest is constantly stimulated by numerous well-produced photographic figures.

G. R. CLARKE.

11.4 : 2 : 6 : 07.2 (74 : 75). COILE, T. S. **A problem analysis for forest soils with special reference to the eastern United States.** Report prepared incident to an assignment in 1939 with the Division of Forest Management Research, U.S. Forest Service. [Duke University, Durham, N.C.] 1940. pp. 75.

11.41. Soil Physics

11.41 : 46 : 91.4. BURGER, H. Physikalische Eigenschaften von Wald und Freilandböden.

VI. Der Wald als Erholungsstätte und der Waldboden. **[Physical properties of forest soils and soils of open land. VI. The forest as a place for recreation and the forest soil.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 21, 1940 (223–49). [G.g.f.]

Trampling damage due to the numerous hikers who frequent the forests in the vicinity of Zurich is apparent from the open state of regeneration and ground flora, the damage to surface roots of trees, etc. The upper 10 cm. of the soil are strongly compressed, the air capacity of the soil has been reduced from about 13–14 to 6–7 per cent. and permeability to rainwater is only a small fraction of that of an unspoilt forest soil. Düggeli has shown that the microfauna of the soil is also undergoing considerable changes both in composition and numbers. The physical and biological changes cause the dying off of numerous roots in depths of 0 to 15 cm. The disturbed soil soon recovers under the influence of vegetation provided further trampling is prevented. The principal remedies recommended include the construction of dense networks of good walking paths and the practice of selection forestry with the object of encouraging shrub growth so as to make the woods less penetrable while increasing their aesthetic value. In the case of private forests the extra cost involved in thus catering for recreation should be compensated for from public funds.

11.43. Biology of Soil, including Mycorrhiza

11.43.1 : 12.25 : 11.48.1 : 11.48.2. THOMAS, W. D. **The mycorhizal fungi and mycorhizae of four coniferous plantations in the Rhine valley.** *Phytopathology* 31, 1941 (567–9). [Colorado State College, Fort Collins.]

A study of mycorrhiza was conducted on 4 one-hectare plots near Karlsruhe in the Black Forest, each plot including plantations of young *Pinus sylvestris*, *P. strobus*, *Picea abies*, and *Larix europaea*. Two of the plots had sandy soils of relatively low N contents, and two had humus soils with higher N contents. Neither hymenomycetes nor mycorrhiza were observed on either sandy plot; on one of the humus plots, formerly the site of an Oak plantation, they were scarce, while on the remaining plot they were numerous. Only on the last-named plot did the trees appear healthy or give promise of high yields, those on the remaining 3 plots generally showing signs of N starvation. Trees bearing ectotrophic mycorrhiza, and the associated mycorrhizal fungi, are tabulated by species.

11.43.1 : 12.25 : 12.21. How, J. E. **The mycorrhizal relations of Larch. II. The rôle of the Larch root in the nutrition of *Boletus elegans* Schum.** *Ann. Bot., Lond.* 5, 1941 (121–31). S. & F. 4 (171) [Bedford College, London.]

A water-soluble substance capable of stimulating the growth of the fungus is present in the roots of European and Japanese Larch, but not in those of Scots Pine. This suggests an indication of the mechanism that brings about the specificity of *B. elegans* for Larch. [Cf. *For. Abs.* 2 (11).]

11.43.2 : 11.47.6 : 13.2. **Termites and soil fertility.** *Niger. For.* 1 (2), 1940 (8–11).

The early stages of an investigation into the possible value of termite activity in the processes of soil recovery in Nigeria are outlined. Observations have been made on the rate of destruction of certain substances such as manure, fruits of *Acacia albida*, cornstalks and grass by termites, and on apparent relations between rate of destruction of these materials and climatic conditions, density of tree cover and species of termite. The effect of termite activity on soil aeration and fertility is shown by soil-analysis data obtained from an active heap, a deserted heap and a control soil.

11.47. Maintenance of Favourable Soil Conditions

11.47.1 : 12.25 : 23.26.4. UNITED STATES. **Twentieth annual report of the Southern Forest Experiment Station, January 1, 1940–December 31, 1940.** New Orleans, La. [1941.] pp. 39.

Longleaf and Slash Pine seedlings that were treated with a compost of rice straw with small amounts of ammonium sulphate, rock phosphate and lime that had been subjected to decomposition for about seven months, were superior in size to untreated seedlings, the effects from 1-, 2- and 3-in. applications of compost being much the same. Improvement of soil fertility in this way makes possible the growth of desirable seedlings at greater than ordinary densities (p. 13).

11.47.12 : 11.47.13 : 23.26.4. BRENER, W. H., and WILDE, S. A. **The effect of non-legume**

green manure upon the fertility of forest nursery soils. *J. For.* 39, 1941 (478–82). [Wisconsin Agricultural Exp. Sta.]

Little improvement was obtained in the organic-matter content, total nitrogen and base-exchange capacity of an outwash sandy nursery soil by the use of non-legume green manure alone. However, when used as a 'catch crop' following the application of mineral fertilizers, green manure was found to be of value in converting these fertilizers into plant tissue, thus reducing the loss of plant nutrients by leaching and preventing chemical injury to the seedling roots. Such treatment is particularly valuable where peat or other absorbing materials are not available.

11.47.12 : 23.26.4 : 07.7. **What's new in farm science. Part 2: Annual report of the Director, Agricultural Experiment Station, University of Wisconsin, Madison.** *Bull. Wis. agric. Exp. Sta.* No. 449, 1940. pp. 96.

The thorough mixing of compost ingredients by means of a shredding machine or rototiller has given better results than the usual practice of stratification (p. 19).

11.47.13. SÜCHTING, H. Praktische Winke für die Kalkdüngung. **[Practical hints on liming.]** *Forstarchiv* 16, 1940 (291–6). [G.] Biol. Abs. 15 (11284).

Lime may be applied as the raw products of limestone quarries and marl pits, as commercially processed marl (about 80 per cent. $CaCO_3$), or as burnt lime (CaO). The last-named should be applied during cool, moist weather in autumn and early winter, the other two at any time. Under certain conditions CaO has started fires. Liming may be done 5–10 years before or 6–8 years after the new stand is established.

11.47.13 : 12.25. FABRICIUS, L. Forstliche Versuche XXII. Ein 10-jähriger N-Düngungsversuch. **[Forestry experiments XXII. A 10-year experiment on nitrogen fertilizing.]** *Forstwiss. Cbl.* 62, 1940 (76–89). [G.] Biol. Abs. 15 (11252).

Report on fertilizer trials begun in 1928 in a 33-year-old stand of Scots Pine on sandy soil. Plots given N fertilizer showed greater diameter, basal-area and volume increment after 5 years than untreated plots, but mere soil cultivation and the application of fertilizers without N resulted in less growth than in check plots. The stimulation of growth by the fertilizer was restricted to the period 2–5 years after application. No effect on height growth was observed. During the second 5-year period, plots treated with K and P without N showed slightly more growth than the others.

11.47.13 : 12.25 : 42.21 : 21.12 : 21.32. **What's new in farm science. Part 2: Annual report of the Director, Agricultural Experiment Station, University of Wisconsin, Madison.** *Bull. Wis. agric. Exp. Sta.* No. 449, 1940. pp. 96.

The application of adequate potash fertilizers, in either liquid or solid form, was found to increase the sugar, starch, protein, and total-solid content in the tissues of the White Spruce, White Pine and Red Pine nursery stock, to increase the osmotic pressure and to lower the freezing point of the sap, all of which increased the frost resistance of the stock (p. 18). [Cf. *For. Abs.* 2 (137).]

11.47.2 : 11.47.13 : 11.48.2 : 12.26–8. REIHLING, K. Ein Versuch mit Besenginster (*Sarothamnus scoparius*) auf degradiertem mittlerem Hauptbuntsandsteinboden. **[An experiment with Broom (*Sarothamnus scoparius*) on a degraded Middle Hauptbuntsandstein soil.]** *Allg. Forst- u. Jagdztg.* 116, 1940 (197–228). [G.] Biol. Abs. 15 (11278).

The soil of the plots studied is naturally acid and tends to form raw humus. Available bases and P and N compounds tend to fall below the limit essential for good tree growth. Broom and lupin improve the soil but need even more available nutrients than the trees. Where the C/N ratio in the organic material is higher than 20:1, Ca is required (as $CaCO_3$ or CaO) in addition to N (as $Ca(NO_3)_2$). The fertilizer is best applied by scattering it on the surface before the leaves fall, without cultivation. Broom seed should be inoculated before sowing.

11.49. Soil Types

11.49.0. COILE, T. S. **Podzol soils in the southern Appalachian Mountains.** [*?Repr. from*] *Soil Science Society Proceedings 1938*, pp. 274–9. [Duke University, Durham, N.C.]

At higher elevations in the southern Appalachians podzol soils have developed, under the influence of the original Red Spruce forest and the cool, moist climate, from two broad types of parent rock—sandstones, sandstone conglomerate and shale in Virginia and West Virginia, and metamorphic or igneous rocks in

North Carolina and Tennessee. The podzol soils reach their highest development in West Virginia on highly siliceous parent material, the total depth of the A_0 horizon often exceeding 12 in. Several podzol profiles developed under Red Spruce, and a brown forest soil developed under a stand of northern hardwoods, are described and illustrated.

11.49.0 : 12.19.2 (213). RICHARDS, P. W. **Lowland tropical podsols and their vegetation.** *Nature, Lond.* 148, 1941 (129–31). [Botany School, Cambridge.]

A general summary of the existing knowledge on the subject.

11.49.2 : 12.19.2–3 : 64. TIKOS, B. Erdészeti sziktalaj-meghatározási módok. **[Forestry methods for determining alkaline ('szik') soils.]** *Erdész. Lap.* 79, 1940 (716–31). [Hu.g.f.e.] L.S.

The use of the botanical method, i.e. the correlation of indigenous vegetation with soil conditions, is preferred to complex chemical analyses. It is pointed out, however, that knowledge of subsoil water conditions is necessary in dealing with alkaline degradation.

11.6. *Hydrographical Conditions. Water and Soil Conservation*

11.6 : 60. CLEMENTS, J. B., and TOPHAM, P. **Water and the land.** Oxford University Press. 1940. pp. 58.

A simple and clear discussion of water, its relationship with the soil and the importance of both as affecting human welfare, particularly in the village communities of Africa.

11.62 : 11.14 : 22.89 : 12.25. KITTREDGE, J., LOUGHEAD, H. J., and MAZURAK, A. **Interception and stemflow in a Pine plantation.** *J. For.* 39, 1941 (505–22). [University of California, Berkeley.]

Conclusions reached as a result of a seven-year study of interception and stemflow in a 28-year-old Canary Island Pine (*Pinus canariensis*) plantation include:—(1) A storm classification based on total precipitation is more satisfactory than one based on rain intensity. (2) A system using five storm classes, namely, 0 to 0·10, 0·11 to 0·30, 0·31 to 0·57, 0·58 to 1·00 and 1·01 inch or over proved convenient. (3) Stemflow usually commences to add moisture to the ground when the precipitation is in excess of 0·20 to 0·25 in. (4) On the average, the storm classes I, II, III, IV, and V contribute 0, 0·03, 0·31, 1·11, and 2·10 per cent. of precipitation as stemflow per storm, or in inches depth, 0, 0·0002, 0·002, 0·007, and 0·034. (5) Stemflow, although apparently not related to crown-length density, tree height, basal area, or crown area, does tend to increase with excess or deficit of height of tree as compared with adjacent trees. (6) Stemflow as high as 13·0 per cent. of precipitation was recorded in some class V storms. (7) In storm class V a maximum constant stemflow percentage is approximately reached, but in inches depth, stemflow continues to increase with amount of rain per storm. (8) The total stemflow for plot areas is approximately 1 per cent. of the total precipitation. (9) Interception varies under different parts of the crowns and in openings. (10) The average interception per cent. is highest on the leeward side of a tree and increases with increase in wind velocity. (11) On the windward side of the tree the minimum average interception per cent. occurs beneath the crown periphery, where −13 per cent. was recorded. An increase in wind velocity gave a higher interception, but as the distance from the stem decreased, interception was less. (12) Interception per cent. is generally highest near the stem and decreases with increased distance from the bole. (13) The small openings between the crowns show interception. (14) The average interception per cent. for the stand is highest for the light rains, then decreases steadily and assumes a nearly constant value in heavy storms. In inches depth the interception is small for light storms and increases with increasing precipitation. (15) Interception storage for this plantation appears to be from 0·02 to 0·04 inch with an average of 0·03 inch. (16) The interception measured by trough gauges up and down the slope close to the ground corresponds closely to that derived from the rows of standard rain gauges. (17) The trees in the plots intercept between 17 and 28 per cent. of the season's precipitation, of which 1 per cent. is returned to the soil as stemflow. *Authors' summary.*

11.62.1 (729.7). BEARD, J. S. **Soil erosion on the island of Chacachacare, Trinidad, B.W.I.** *Carib. For.* 2, 1941 (136–7). [E.span.]

Serious sheet erosion in two valleys that are covered with clumps of bushes is ascribed to overgrazing by chickens, which prevent the formation of a herbaceous ground layer.

11.62.1 : 32.91.1 : 22.11 : 22.14.2. HAWES, N. E. **Soil losses from skidding operations in the Ouachita Mountains.** *Sth. For. Notes* No. 36, 1940 (2).

Survey data showed that where the stand was clear-cut to 9 in. d.b.h. skidding operations laid bare at least 2·5 per cent. of the area and removed 3·6 tons of top soil per acre, the soil losses being 40 per cent. greater on steep (over 20 per cent.) than on gentle (under 20 per cent.) slopes. On the selectively-cut areas 1·2 per cent. of the area was affected and less than 1·5 tons of soil per acre were lost, although losses were 100 per cent. greater on steep than on gentle slopes.

11.62.1 : 60 : 97.1 (66.9). RANDELL, P. C. **Soil degradation and land use in Onitsha Province.** *Niger. For.* 1 (2), 1940 (21–5).

The factors responsible for extensive soil degradation and consequent erosion, the effect of this deterioration on rural economy, and present and possible future actions for dealing with this problem are discussed briefly. The basic causes of widespread sheet erosion are noted as the removal of forest vegetation, poor and harmful methods of farming, and annual burning of grasslands.

11.62.11 : 23.3 (81). PÉREZ, H. M. Dunas y forestación. **[Dunes and afforestation.]** *Maderil* 13 (150; 151; 152; 153) 1940–41 (11–5, 25; 11–6; 11–6; 12–6, 25–6). [Span.]

Report on the reclamation of several mobile dunes on the south-eastern littoral of the Province of Buenos Aires. The herbaceous and woody species that have proved successful in this project are listed. The latter include Pines, Cypresses, Acacias, and Eucalypts.

11.62.11 : 23.3 : 12.26–8. JOHNSON, J. A. **Planting *Lespedeza sericea* with Black Locust.** *Soil Conservation* 6, 1940–41 (331–2, 334).

A brief account of successful demonstrations, by the Soil Conservation Service, of the growing of these species in mixture on Mississippi farms. The combination is claimed to provide better erosion control than Black Locust alone, because a close ground cover is more quickly obtained. Additional shelter and food for wildlife is also provided.

11.62.31 : 38.8. ROBINSON, A. G. **The training of alluvial rivers.** *Malay. For.* 10, 1941 (42–8).

Description of the work carried out in the training of the Bentong river in the vicinity of Bentong town. The technique of fencing adopted to retain silt and thus to allow of the river's scouring a channel is based on F. A. Leete's method ('Regulation of Rivers without Embankments'. London. 1924).

12.1. *General Botany*

12.11. Physiology. Reproduction. Growth

12.11.1. *Plant Constituents. Sap Flow. Transpiration. Growth Substances*

12.11.11 : 12.26–8 : 12.14.8. CLOTOFSKY, E., WEIKERT, H., and NICK, H. Zur Kenntnis der Buchenrinde (*Fagus silvatica*). **[On [the chemical constituents of] Beech (*F. sylvatica*) bark.]** *Ber. dtsch. chem. Ges.* 74, 1941 (299). *Abstr.* in *Auszüge aus der Literatur*—suppl. to *Cellulosechemie* 19, 1941 (59). [G.] P.R.

12.11.12 : 12.11.14 : 12.25 : 21.2. SCHUBERT, A. Untersuchungen über den Transpirationsstrom der Nadelhölzer und den Wasserbedarf von Fichte und Lärche. **[Investigations on the transpiration stream of conifers and the water requirements of Spruce and Larch.]** *Thar. forstl. Jb.* 90 (821-83). *Abstr.* in *Forstarchiv* 17, 1941 (165). [G.]

Thermoelectric measurements of the velocity of the sap stream showed that in Norway Spruce, Scots Pine, and Silver Fir the velocity was almost without exception lower than 1 m. per hour, which is below the values for diffuse-porous hardwoods. Larch was the only conifer studied in which the sap stream was as rapid at midday as in the diffuse-porous hardwoods. The sap-stream velocity decreased by species in the order: Larch, Norway Spruce, Scots Pine, Silver Fir. Sap flow was almost at a standstill at sunrise, increased up to mid-day, and decreased during the evening at a slower rate than that of the morning increase. Sudden showers and drops in temperature rapidly checked sap flow. Transpiration measurements were made on Larch, Norway Spruce, Scots Pine, White Pine, and Beech, using a torsion balance. Larch had the highest rate of evaporation, amounting to 8 mg. of water per g. of fresh needle weight per minute, which is 3–4 times as high as that of the remaining conifers. The daily water loss of Larch amounted to almost 5 times its fresh needle weight. The daily transpiration of trees about 60 years old was estimated for the 19–20th July and the

27–28th September, respectively, as follows:—Larch 90 and 38 l.; Norway Spruce 63 and 27 l.; Scots Pine 50 and 18 l.; White Pine 86 and 29 l.; Beech 84 and 46 l. Though Larch stands are more open than those of Spruce, it was calculated that Larch transpires 66 cu. m. of water per ha. in July and 28 cu. m. per ha. at the end of September, as against 33 and 14 cu.m. per ha. for Spruce at the same times of year. The high transpiration of Larch is rendered possible by the structure of its needles and the higher conductive area of its tracheids.

12.11.15 : 12.25 : 12.11.23. MIROV, N. T. **Distribution of growth hormone in shoots of two species of Pine.** *J. For.* 39, 1941 (457–64). [California Forest & Range Exp. Sta.]

The presence of growth hormone is one of the most important hereditary factors controlling the growth of plants, and information on the hormone concentration of forest trees would give an indication of their hereditary vigour. The author describes an investigation into the presence and distribution of growth hormone in *Pinus ponderosa* and *P. torreyana*, Went's *Avena* method for the assay of hormone being used in this work. It was found that the auxin concentration in developing shoots is lowest at the tip and increases to a maximum near the base, and that in Ponderosa Pine the hormone concentration was always higher in fast-growing than in slow-growing young trees. Determination of hormone concentration in the stem of Torrey Pine by the extraction method showed it to be higher in the xylem than in the phloem, while determination by the diffusion method gave similar concentrations for the two regions.

12.11.2. *Propagation. Growth. Development*

12.11.21 : 12.25. LITTLE, E. S. **Development of cones and seeds in Piñon (*Pinus edulis* Engelm.).** *Abstr.* in *Amer. J. Bot.* 27, 10, 1940 (6s). [Southwestern Forest & Range Exp. Sta.] O.B.D.

The earliest stages of cones inside the buds are distinguishable with a hand lens in autumn two full years before maturity. Pollination occurs about the middle of the next June, fertilization takes place a year later, and cones and seeds mature the following September.

12.11.21 : 12.25 : 12.11.3. HAUPT, A. W. **Oögenesis and fertilization in *Pinus lambertiana* and *P. monophylla*.** *Bot. Gaz.* 102, 1941 (482–98). [University of California, Los Angeles.] O.B.D.

A detailed account is given of the cytological processes involved. In both species the interval between pollination and fertilization is almost exactly a year.

12.11.21 : 12.25 : 21.8. ROESER, J. **Some aspects of flower and cone production in Ponderosa Pine.** *J. For.* 39, 1941 (534–6). [U.S. Forest Service.]

The normal blossoming period of Ponderosa Pine in central Colorado occurs about mid-June immediately after the danger of freezing weather has passed. Staminate flowers may open shortly before the last freezing weather but pistillate flowers rarely do so. Flower crops are usually large and, in general, the ultimate size of the cone crop cannot be predicted from the size of the pistillate flower crop. Production of staminate and pistillate flowers is closely correlated. One-third of the total cone growth takes place in the first growing season and growth is completed in the second season. Cone mortality is greatest during the first season. The average green weight of cones and the weight of the seed decreases as the number of cones per cluster increases. *From author's summary.*

12.11.21 : 12.25 : 12.11.3. WETTSTEIN, W. VON. Zur Blütenbiologie von *Pinus silvestris*. [**On the biology of flowering in *Pinus sylvestris*.**] *Z. Forst- u. Jagdw.* 72, 1940 (404–9). *Abstr.* in *Forstarchiv* 17, 1941 (135). [G.]

Female flowers of Scots Pine become receptive at the same time as the male flowers begin to shed pollen, a process that takes place very rapidly in favourable weather. Pollination over long distances can take effect only when adjacent trees have stopped shedding their pollen. If climatic conditions render pollen from the same stand ineffective, pollination very seldom occurs, although the receptive period of the female flowers lasts at least twice as long as that of pollen shedding. The dominance of local pollen over that borne from a distance explains the great uniformity of original forest stands.

12.11.21 : 12.26–8 : 23.23.15. ROHMEDER, E. Die Vermehrung der Pappeln durch Samen. [**The propagation of Poplars by seed.**] *Forstarchiv* 17, 1941 (73–80). [G.g.] [Forschungs- und Prüfstelle für forstliches Saatgut, München.]

A review of German literature on the collection and sowing of Poplar seed is followed by an account of the writer's own investigations on its viability. The viability of seed cleaned of seed wool was maintained for several weeks to a few months by storing the seed either in glass bottles at 2° to 4° C. or in a partial vacuum at room temperature. A combination of low temperature and partial vacuum allowed the seed to be stored for several months to a year. Low-temperature storage for several months was also accomplished without removing the seed wool, provided the latter was dry at the start.

12.11.22 : 12.11.15. GRACE, N. H. **Effects of potassium acid phosphate, cane sugar, ethyl mercuric bromide, and indolylacetic acid in a talc carrier on the rooting of stem cuttings.** *Canad. J. Res.* 19, Sec. C, 1941 (99–105). [National Research Laboratories, Ottawa.] P.R.

Results from experiments with greenwood cuttings of the shrub species *Deutzia lemoinei*, *Symphoricarpus albus*, and *Weigela rosea* and dormant cuttings of *Lonicera tatarica* indicate that the effectiveness of dusts containing indolylacetic acid in the treatment of plant stem cuttings may be increased by the addition of nutrient and disinfectant chemicals. *From author's summary.*

12.11.22 : 12.25–8 : 12.11.15. LIESE, J. Beiträge zur vegetativen Vermehrung von Forstgewächsen. **[On the vegetative propagation of forest plants.]** *Forstarchiv* 17, 1941 (83–8). [G.]

A review of a number of recent papers on this subject.

12.11.22 : 12.25 : 12.11.15. DELISLE, A. L. **Histological and anatomical changes induced by indole-acetic acid in rooting cuttings of *Pinus strobus*.** *Abstr.* in *Amer. J. Bot.* 27, 10, 1940 (3s). O.B.D.

Cuttings and brachyblasts from 4-year-old seedlings of *Pinus strobus* root readily after auxin treatment. Changes in the tissue of treated cuttings are described. Cuttings and brachyblasts from young and old trees show differences in rooting ability. Rooted brachyblasts, unlike rooted cuttings, are not able to survive unless adventitious buds have previously been caused to develop in them; these, when rooted, grow into normal cuttings.

12.11.22 : 12.26–8 : 12.11.15. SNOW, A. G. **Variables affecting vegetative propagation of Red and Sugar Maple.** *J. For.* 39, 1941 (395–404). [Northeastern Forest Exp. Sta.]

Greenwood cuttings of Red and Sugar Maple were collected at various times during early summer and given different auxin treatments before being planted in outdoor propagating beds. The highest percentage of cuttings rooting was obtained with three-hour indolebutyric acid treatments at concentrations of 50 mg./l. for Sugar Maple and 200 mg./l. for Red Maple. A possible difference in inherent rooting capacity was found among 24 Red Maple clones tested, where rooting varied from 17·5 to 97·5 per cent. Other conditioning factors studied indicate that (1) 4-in. were better than 6-in. cuttings; (2) the shortest treatment period tried (3 hours) was better than 6, 12, or 24 hours; (3) no great difference between the effectiveness of indoleacetic and indolebutyric acid was observed in the concentrations and time of year in which both were used; (4) additional sucrose treatments did not materially aid rooting over optimum auxin treatments; and (5) different rooting types characterized as 'early' and 'delayed' were found, indicating a possible difference in physiological maturity at time of collection or possible inherent variation between the parent stocks. *Author's summary.*

12.11.22 : 12.26–8. SHUTOV, P. A. **The propagation of Eucalypts by layering.** *Sovetsk. Subtrop.* 1940 (8), (30–2). [R.] C.G.B.

Report on an investigation in Azerbaijan with *E. rostrata*. One- to two-year-old basal shoots of 50 to 120 cm. length and 0·25 to 0·8 cm. diameter at the thicker end were used for the layering. This was carried out in August and by the following April a 71-per-cent. rooting had been obtained, the unsuccessful shoots being those with a diameter of only 0·25 to 0·35 cm. at the thicker end. It is thought that shoots used for layering should have a length of at least 50 to 80 cm. and a diameter of at least 0·4 to 0·6 cm. at the thicker end.

12.11.22 : 12.26–8. AKSENT'EV, B. N. **The rooting of cuttings of *Cytisus laburnum* L. [*Laburnum anagyroides* Med.].** *Bot. Zh.* 25, 1940 (520–31). [R.g.] A.P.B.

The rooting was preceded by callus formation. While the roots developed best in water

and very wet soil and sand, callus formation generally required a less moist environment—humid air or soil and sand having a moisture content of 20–30 per cent. Failure of cuttings to root in a very wet medium may therefore be due to conditions unfavourable for callus formation.

12.11.3. *Heredity. Breeding. Hybridization. Races and Questions of Provenance*

12.11.3. WETTSTEIN, W. VON. Wuchssteigerung durch Kombinationszüchtung und Chromosomenvermehrung. **[Improvement of growth by hybridization and polyploidy.]** *Forstarchiv* 17, 1941 (80–3). [G.]

Review of a number of recent papers showing the utility of these methods in the improvement of forest trees.

12.11.3. SVOBODA, P. Kříženci lesních dřevin a cesty k jejich využití. **[Forest tree hybrids and their utilization in forestry.]** *Lesnická Práce* 19, 1940 (373–408). [Cz.] Biol. Abs. 15 (11285).

Hybrids in *Taxus*, *Abies*, *Picea*, *Pinus*, *Larix*, *Juniperus*, *Salix*, *Populus*, *Betula*, *Alnus*, *Corylus*, *Ulmus*, *Juglans*, *Quercus*, *Sorbus*, *Prunus*, *Pyrus*, *Crataegus*, *Tilia* and *Acer* are listed and the possibility of producing new hybrids with special properties is suggested.

12.11.3 : 07.2. **The Commission on forest seeds and tree race problems of the International Union of Forest Research Organizations.** *Chron. bot.* 6, 1941 (207). O.B.D.

Seed of *Pinus sylvestris* from 55 sources and of *Picea abies* from 36 sources was distributed in 1938 and sown by stations in Europe and the United States. A uniform lay-out consisting of 5 replications, with plots of 200 plants spaced 1·3 × 1·3 m., has been agreed upon. Preliminary plans have been made for starting new international provenance experiments with *Quercus pedunculata*, *Larix decidua*, and *Abies alba*. Other aims of the Commission include the compilation of a tree-seed bibliography and co-ordination of research in forest genetics. A proposal has also been worked out for international rules to be used in forest seed testing.

12.11.3 : 12.25 : 21.12 : 12.11.2. OSBORN, A. **An interesting hybrid conifer: *Cupressocyparis leylandii*.** *J. R. hort. Soc.* 66, 1941 (54–5). Pl. Breeding Abs. 11 (590).

A natural hybrid between *Cupressus macrocarpa* and *C.* (*Chamaecyparis*) *nootkatensis* has been given the above name. In the great frost of January, 1940, it proved much hardier than *C. macrocarpa*. It is easy to propagate from cuttings, and seedlings have also been raised.

12.11.3 : 12.25. RUBNER, K. Die Ergebnisse zehnjähriger Lärchenherkunftsversuche im Erzgebirge. **[The results of ten-year Larch provenance trials in the Erzgebirge.]** *Thar. forstl. Jb.* 92, 1941 (15–48). [G.g.] [Forstliche Versuchsanstalt Tharandt.]

Report on sample-plot trials with European Larch of different seed origins, including various regions of the Alps, Eastern Sudeten country, Higher and Lower Tatra, Poland, and Scotland, and with *L. leptolepis*, *L. koreensis*, and *L. sibirica* from the Archangelsk region. Among European Larch the fastest early growth was exhibited by the Sudeten race, which in the lower elevations of the Erzgebirge reached a height of about 5·75 m. at the age of 10 years. The Wienerwald, Higher Tatra, and Poland provenances were only slightly slower-growing than the Sudeten race. Alpine Larches from the Cavalese (800–1300 m. altitude) and Blühnbach (800–900 m. altitude), though of somewhat slower growth, could still be regarded as fast-growing; those from higher elevations up to about 1,800 m. showed medium growth; while those from the high altitudes (above 1,800 m.) of the Central Alps (Pontresina, Briançon, and Hautes Alpes) were distinctly slow-growing. Scottish Larch grew about as fast as the fast-growing Alpine races. Larch from the Lower Tatra proved also relatively fast-growing, and it is not certain whether it is incapable of growing as fast as the Larch from the Higher Tatra. *L. leptolepis* grew faster than any of the provenances of European Larch, the rate of growth of *L. koreensis* equalled that of the fast-growing races of European Larch, while the Siberian Larch from the Archangelsk region was distinctly slow in growth. The sample plots were situated at different altitudes, and it was found that all the Larch races tested grew slower from elevations of 550–600 m. upwards, the fast-growing races being the most affected by the rough climate of the higher altitudes of the Erzgebirge. On these sites the Sudeten Larch maintained its tendency to form long annual shoots, while the Tatra Larch adapted its height growth to the shorter vegetation period. None

of the sample plots suffered from Larch canker, and the writer suggests that those races of European Larch that grow fast in their youth are resistant to the disease. This is also supported by data from Württemberg, where the only fast-growing Larch to be attacked by canker is that of Scottish origin.

12.11.3 : 12.25 : 21 : 47. SCHÄDELIN, W. Ergebnisse der Lärchenforschungen von Prof. Dr. Ernst Münch und waldbauliche Folgerungen. **[Results and silvicultural significance of Dr. Ernst Münch's research on Larch.]** *Schweiz. Z. Forstw.* 92, 1941 (41–9, 67–79). [G.]

The proof that Larch disease is directly related to frost conditions makes it necessary to avoid races whose vegetation cycle does not fit in with the local climate. The most promising means of origin control under Swiss conditions is the natural regeneration, wherever practicable, of stands that have proved themselves to be adapted to the site on which they grow.

12.11.3 : 12.25 : 12.11.21. DUFFIELD, J. W., and SNOW, A. G. **Effect of storage conditions on pollen longevity of *Pinus strobus* and *Pinus resinosa*.** *J. For.* 39, 1941 (410–1). [Northeastern Forest Exp. Sta.]

Storage tests, using four levels of relative humidity (0, 10, 25, and 50 per cent.) and four levels of temperature (0°, 4°, 30° C. and normally fluctuating room temperature), showed definitely that the most satisfactory storage conditions of those tested were a relative humidity of 50 per cent. and temperatures of 0° to 4° C., at which pollen was still more than 80 per cent. germinable after a period of 12 months.

12.11.3 : 12.25 : 12.26–8 : 06.1 : 23.3 (43.9) : 11.48.2 : 11.49.2. PETRINI, S. Från en resa till Österrike och Ungern hösten 1940. **[From a trip to Austria and Hungary in autumn 1940.]** *Svenska SkogsvFören. Tidskr.* 38, 1940 (239–60). [Sw.]

An account is included of Cieslar's Norway Spruce seed-origin trials, laid out in 1899 using 3-year-old plants, at Loimannshagen in the Wienerwald, and the results of remeasurements in 1936 are tabulated and discussed. 'Edling', the lowland Carinthian provenance that showed the best height growth in early youth, has now been surpassed in survival by 14 other provenances, in diameter by 3 others, and in height growth by 1 other provenance. The last-named—'Cavalese' from alt. 1,100 m. in the southern Tyrol—is now an easy first in both diameter and height growth. In general, the better growth of the lowland provenances as young trees has been smoothed out, though it may nevertheless have the advantage of shortening the period of danger from weed competition and game damage in places where these factors hinder establishment. A more significant result, however, is that the trials show a strong correlation between 1,000-seed-weight and both diameter and height growth. This was observed by Cieslar, but its effect is even more marked in the 1936 measurements.

Brief notes are also given on Cieslar's trials of Pedunculate Oak provenances, established in 1905 at Steinbach, Wienerwald. The last measurements of these, made in 1933, showed no great differences in development, but as seen in 1940 the provenances appeared to vary considerably in growth form and general promise. The remainder of the paper comprises notes on a conference of the special committee on forest tree seeds and races of the International Union of Forestry Research Organizations, held in Vienna in October, 1940; impressions of the Wienerwald; an account of the history and organization of the Centre International de Sylviculture; and notes on an excursion to afforestation areas on shifting-sand and szik soils in the Hungarian Great Plain. [Cf. *For. Abs.* 3 (128).]

12.11.3 : 12.26–8 (485). JOHNSSON, H. Växtförädling av björk—mål och medel. **[Breeding of Birch—aims and methods.]** *Svensk PappTidn.* 44, 1941 (—, 54–7, 86–91, —). [Sw.e.] L.S.

The aims and methods of tree breeding are considered at some length, with particular reference to probable applications in an extensive Birch breeding programme recently embarked upon by the Swedish Forest Tree Breeding Association. Chief among the subjects discussed are:—the biology of reproduction and the natural variability of species in relation to desirable properties such as disease resistance, rate of growth, and timber quality; selection of desirable types; field trials; intra- and interspecific hybridization; colchicine treatment to induce polyploidy; possibilities of hastening breeding and field trials by inducing precocious reproduction and by efforts to discover characters in seedlings that might be used to forecast those of the adult trees; and the uses of sexual and vegetative propagation. The

examples illustrating this discussion are drawn mainly from existing literature; the Association's work on Birch is still in its initial stages, but it may be noted that the first colchicine treatments, made in 1939, have already yielded polyploid or mixoploid seedlings of both *Betula verrucosa* and *B. pubescens.* [*From middle instalments and part of author's summary: remainder of paper not available.*]

12.11.3 : 12.26–8. WILKINSON, J. **The cytology of the Cricket-bat Willow** (*Salix alba* **var.** *caerulea*). *Ann. Bot., Lond.* 5, 1941 (149–65). Pl. Breeding Abs. 11 (565).

The somatic chromosome complements of *Salix alba* and its varieties, of *S. fragilis*, and of a number of selected hybrids and 'unknowns' have been examined. *S. alba* and *S. fragilis* both have $2n = 76$ and the chromosome complements are similar. Most *S. alba* plants have 4 satellited chromosomes while the Cricket-bat Willows (var. *caerulea*) appear to have only 2. The hybrids studied (× *S. viridis* var. *rystonensis* and var. *eleyensis*, and matroclinous and patroclinous *caerulea* × *basfordiana* crosses) also had $2n = 76$ but their chromosome complements were different from those of *S. alba* and *S. fragilis* in their size-class distribution. The identification of a number of 'unknowns' is attempted from a study of their chromosome complements. Meiosis was studied in two plants of *S. alba* var. *caerulea*, in *S. fragilis* var. *basfordiana*, and in two individuals from a *caerulea* × *basfordiana* cross. Occasional quadrivalents and univalents were observed in the hybrids.

12.11.6. *Phenomena of Movement*

12.11.6 : 07.7 : 52. PYKE, E. E. **Trunk diameter of trees of** *Hevea brasiliensis:* **experiments with a new dendrometer.** *Nature, Lond.* 148, 1941 (51–2). [Rubber Research Institute of Malaya, Kuala Lumpur.]

A description is included of a sensitive dendrometer which was designed and constructed at the Rubber Research Institute of Malaya to study the daily changes that occur in the trunk diameters of Rubber trees, and the extent to which the outflow of latex affects the diameter in the region of the cut. The instrument is more sensitive than the self-recording dendrograph of MacDougall. Rapid small changes of diameter can be measured to a limit of about 0·0005 mm.

12.12. Teratology

12.12 : 12.25 : 12.11.3. BALDWIN, H. I. **Fasciation as a source of deformity in Scotch Pine.** *Abstr.* in *Amer. J. Bot.* 27, 10, 1940 (1s). [New Hampshire Forestry and Recreation Department, Hillsboro.] O.B.D.

In the summer of 1939, 5-year-old Scots Pines that had previously grown normally developed many buds on the terminal shoots. During the next year a lateral branch assumed the position of leader and made very long growth, while the former leader developed a bunch of short laterals and made very little growth. The condition was more common in races from central and southern Europe than from northern areas and may be a reaction to some combination of weather conditions.

12.14. Organography. Morphology. Anatomy. Histology

12.14.3 : 11.49. DUNCAN, W. H. **A study of root development in three soil types in the Duke Forest.** *Ecol. Monogr.* 11, 1941 (141–64). [University of Georgia.]

Root development in seedlings of a number of tree species was studied in Congaree clay loam, Georgeville clay, and Orange loam soils in the Duke Forest, North Carolina. The Congaree soil was highest and the Orange soil lowest in water-holding capacity and the amount of available water at times when soil moisture was near the lower limit of availability. The Georgeville soil had the highest field percolation rate, the greatest air space and the lowest CO_2 content, while the Orange soil showed the converse for these factors. The Congaree soil had the highest proportion of sand throughout the profile, the Georgeville soil was clayey throughout, especially in the B horizons, and the Orange soil had a loamy A horizon and B horizons of compact impervious clay. Aggregation of soil particles was most pronounced in the Georgeville and least so in the Congaree soil.

Seedling development, root development on a dry-weight basis, and total length of secondary roots, were in general greatest in the Orange and least in the Congaree soils, but differences in root weight were not always proportional to differences in plant weight. Species whose roots were confined to the A horizon showed either little difference in maximum depth of rooting or a direct correlation with total depth of rooting in the 3 soils. In deeper-rooting

species the B_1 horizon of the Orange and Georgeville soils appeared to retard penetration as compared with the Congaree soil. Any effect that the texture of the A horizons may have had must have been overshadowed by some other factor. Differences in aeration were probably not responsible for the variation, as the most poorly aerated soil had the greatest root development. It appeared also that root competition was not a governing factor in root development. An inverse relationship was found between soil fertility, as judged by nitrates and C/N ratios, and root growth; acid/base reactions did not vary sufficiently to have caused appreciable variation. Root development was directly proportional to evaporation as measured by Livingston atmometers, and relative amounts of shading may have influenced root growth. There was an inverse relation between available soil moisture and root growth; data from the investigation indicate that lower available moisture may increase root development relative to plant development but do not show whether total root development is also affected.

12.14.3 : 11.49. GURSKI, A. V. **Root systems of trees in steppe and desert soils.** *Dokl. vsesoyuzn. Akad. s.-kh. Nauk* 1939 (5/6), (45–9). [R.] H.S.B.

Report on investigations in chernozems and grey desert soils in the south-western part of the Turkmen Soviet Republic. The principal results are summarized below.

Character of the root systems of the species investigated

No.	*Species*	*Age*	*Number of samples*	*Root depth*	*Intensity of root system**	*Percentage of roots below 1 metre depth*
1	*Acer negundo* L.	15	10	4·0	14·0	4·6
2	*Ailanthus glandulosa* Desf.	8	3	4·0	—	—
3	*Catalpa speciosa* Warder	10	4	2·0	4·5	2·0
4	*Catalpa ovata* G. Don	10	3	2·0	3·0	4·6
5	*Celtis occidentalis* L.	10	3	4·0	4·7	5·5
6	*Fraxinus excelsior* L.	20	10	8·0	23·0	37·0
7	*Fraxinus pennsylvanica* Marsh.	20	8	3·0	34·5	15·5
8	*Fraxinus mandshurica* Max.	10	3	1·5	9·0	0·0
9	*Fraxinus rhynchophylla* Hance	10	3	1·5	15·0	1·4
10	*Fraxinus ornus* L.	10	3	1·6	4·5	2·5
11	*Gleditsia triacanthos* L.	20	5	1·6	4·5	2·5
12	*Juglans nigra* L.	10	3	4·0	3·0	3·6
13	*Juglans cinerea* L.	10	3	2·0	2·2	2·0
14	*Juglans mandshurica* Max.	10	3	2·0	0·7	0·2
15	*Populus canadensis* Wesm.	12	3	4·0	0·6	9·3
16	*Populus balsamifera* L.	12	3	2·0	1·2	4·5
17	*Populus simonii* Carr.	12	3	2·0	0·5	0·7
18	*Phellodendron amurense* Rupr.	10	3	1·8	7·0	2·3
19	*Robinia pseudoacacia* L.	20	5	5·0	3·3	9·3
20	*Quercus robur* L.	20	4	7·5	22·0	41·5
21	*Ulmus campestris* L.	10	3	2·5	4·5	0·7
22	*Ulmus effusa* Willd.	10	3	2·0	7·5	2·0
23	*Sophora japonica* L.	10	2	3·5	—	—
24	*Caragana arborescens* L.	10	4	1·5	2·5	0·5
25	*Ligustrum vulgare* L.	10	4	1·2	23·0	3·0
26	*Cornus sanguinea* L.	10	4	1·5	16·5	3·0

* Weight of small, absorbing roots in per cent. of the weight of large, conducting roots.

Fraxinus species	*Age (years)*	*Root depth (m.)*	*Height (m.)*	*Diameter (cm.)*
F. excelsior	10	8·0	6·96 ± 0·43	7·23 ± 1·5
F. pennsylvanica	10	3·0	5·86 ± 0·54	5·87 ± 1·1
F. mandshurica	10	1·5	3·55 ± 0·5	3·56 ± 0·8
F. rhynchophylla	10	1·5	3·56 ± 0·6	4·22 ± 0·83

Under identical soil conditions the different woody species developed entirely different root systems. Within the same genus, root development in different species was clearly related with the height and diameter growth of these species under steppe conditions, as exemplified by the data for *Fraxinus*.

12.14.3 : 12.11.23 : 21.3 : 21.2 : 12.11.12. SALTER, R. M. **Some soil factors affecting tree growth.** *Science* 91, 1940 (391–8). [Ohio Agricultural Exp. Sta.] O.R.S.

A general discussion is presented of the physiology of plant root action in relation to soil factors, particular stress being laid upon those that affect root growth and permeation, as the normal uptake of both water and mineral salts appears to depend on the continued establishment of fresh contacts between roots and the soil. Soil characteristics such as available water capacity, permeability to water, and permeability to air are largely determined by the volume and size distribution of the soil pore space. A better understanding of root/soil relationships should result from extended studies of the effects of pore-space conditions on root development, and from the development of micro-methods for investigating physical and chemical conditions at the actual interface between root and soil.

12.14.3 : 12.25. DAY, M. W. **The root system of Red Pine saplings.** *J. For.* 39, 1941 (468–72). [Dunbar Forest Exp. Sta.]

A study of the root systems of five Red Pine saplings, varying in height from 5·3 to 11·0 ft. and in age from 12 to 14 years, showed them to consist of a well developed lateral system with both ascending and descending branch roots, which often assumed major importance. Variations in site conditions apparently produced striking changes in root development, trees growing in lighter soil and in drier situations developing more extensive root systems with more deeply descending sinker roots. The lateral roots were found to occur within 1 ft. of the surface and only sinker and tap roots occurred below this depth. Size data, plan and transect view are given for each root system examined. *From author's summary.*

12.14.5 : 12.14.6 : 12.26–8 : 12.11.14. CUMMINGS, W. H. **A method for sampling the foliage of a Silver Maple tree.** *J. For.* 39, 1941 (382–4). [Central States Forest Exp. Sta.]

A highly significant correlation was found between the number of leaves on a tree branch and the square of the branch diameter. Thus the total number of leaves on a tree can be determined from the number of branches in each diameter class and an estimate of the number of leaves on each branch-size based on the count of a random sample. As a framework for sampling leaf functions the branches are divided into ten diameter and position classes, five two-tenth-inch classes for both the upper and lower part of the crown. A trial leaf-sampling test of the weight, area, and moisture loss of the foliage was made from a series of 35 individual leaf determinations apportioned to the ten branch classes on the basis of the proportion of leaves in each class, individual branches and leaves being selected at random.

12.19. Geographical Distribution. Plant Geography and Sociology

12.19 (66.9) : 22.2 : 11.62.1 : 11.14.6 : 24.4 : 11.12 : 60.1 : 34.21 : 12.11.22. FAIRBAIRN, W. A. **Ecological and climatic studies in Kano and Katsina.** *Niger. For.* 1 (2), 1940 (25–9).

The description of a number of experiments undertaken to obtain proved data on problems relating to regrowth of certain types of vegetation, direct sowing of indigenous species, effect of vegetation on evaporation and wind resistance, the densification of protected natural vegetation, the relative value of early and late burning, and propagation from cuttings.

12.19 (75.6). ROBERTS, E. V., and CRUIKSHANK, J. W. **The distribution of commercial forest trees in North Carolina.** *For. Surv. Release Appal. For. Exp. Sta.* No. 8, 1941. pp. 27.

A series of maps shows the distribution and areas of dense concentration of selected forest tree species of commercial importance in certain sizes. The total volume of sound trees is recorded on each map by diameter class for each survey unit and for the State.

12.19 (75.7). ROBERTS, E. V., and CRUIKSHANK, J. W. **The distribution of commercial forest trees in South Carolina.** *For. Surv. Release Appal. For. Exp. Sta.* No. 9, 1941. pp. 20.

Note preceding abstract.

12.19 : 12.25 : 12.26–8. CRETZOIU, P. Distribuția geografică generală a plantelor lemnoase din România. III. **[General distribution of**

the woody plants of Rumania. III.] *Rev. Pădurilor* 53, 1941 (65–9). [Rum.f.]

Note on the regional distribution of Beech, Silver Fir, and Ivy in Rumania.

12.19 : 12.25. DOMIŇ, K. O proměnlivoti tisu (*Taxus baccata* L.) a o t. zv. Netřebském tisovém haji. **[Varieties of Yew and the so-called Netřeb Yew forest.]** *Lesnická Práce* 19, 1940 (117–46; 246–84; 293–318). [Cz.] Biol. Abs. 15 (13171).

Noteworthy Yew stands in Czechoslovakia and elsewhere in Europe are listed, and the uses and poisonous properties of the species are discussed. Nine subspecies are recognized. The final section describes a famous stand of Yew in the Netřeb forest and its associated vegetation.

12.19.1. *Regional Floras*

12.19.1 (410). STEP, E. **Wayside and woodland trees.** [New edition, revised by A. Keith Jackson and A. Bruce Jackson.] Frederick Warne & Co., Ltd., London and New York. 1940. pp. 186.

12.19.1 (54.1). RAIZADA, M. B. **On the flora of Chittagong.** *Indian For.* 67, 1941 (245–54).

A list is given of species not previously recorded from this region.

12.19.1 (75.8). BISHOP, G. N. **Native trees of Georgia.** Div. Forestry, Georgia Dept. Nat. Resources, Atlanta and Athens. 1940. pp. 96. Biol. Abs. 15 (11247).

12.19.2. *Forest Types*

12.19.2 (54.8) : 09.7. KRISHNASWAMY, K. **The evergreen Ghat rain forest; Agumbe-Kilandur zone.** *Indian For.* 67, 1941 (184–203).

A descriptive account is given of the forest of the Agumbe-Kilandur region in the Western Ghats of Mysore, which belongs to the 'southern tropical wet evergreen forest' of Champion's classification. The topographical distribution of growth regions within the type and the composition of the various associations are discussed, general impressions of the forest are recorded, and brief notes are given on ecological factors. Phenological data for the important tree species are tabulated. Natural regeneration is said to be abundant on most of the areas exploited for sleepers, less so where only pole fellings have been made, and least of all in the virgin forest.

12.19.2 (75.6) : 04.4. **Major forest types, State of North Carolina.** [Map.] Appalachian Forest Experiment Station, Asheville, N.C. 1940.

12.19.2 (75.7) : 04.4. **Major forest types, State of South Carolina.** [Map.] Appalachian Forest Experiment Station, Asheville, N.C. 1940.

12.19.2 : 43 : 23.1 : 12.25. GRAHAM, S. A. **The question of Hemlock establishment.** *J. For.* 39, 1941 (567–9). [University of Michigan.]

Reference is made to an article—'The role of fire in the perpetuation of virgin forests of northern Wisconsin' [cf. *For. Abs.* 3 (33)], and it is pointed out that while Hemlock reproduces intermittently it cannot be classed as a fire species, and evidence is given to show that it can establish itself on the forest floor under an undisturbed stand. Moist conditions apparently favour seedling establishment. The presence of fairly even-aged Hemlock stands in areas that have been burned in the past may be due to the survival of the larger, more fire-resistant trees of relatively uniform age rather than to the establishment of post-fire regeneration.

12.19.3. *Other Vegetation Types*

12.19.3. CANFIELD, R. H. **Application of the line interception method in sampling range vegetation.** *J. For.* 39, 1941 (388–94). [Southwestern Forest & Range Exp. Sta.]

12.19.3 : 60. MACKAY, J. H. **On some applications of grassland ecology.** *Niger. For.* 1 (2), 1940 (62–6).

Reference is made to work that has been done on the grasslands of South Africa, the principles of which are being used as the basis for a study of the grass flora around Ibadan. Two main vegetational regions are recognized in southern Nigeria, represented by the Savanna and the High Forest climax types respectively, although the Savanna is not considered a stable climax type but rather one that would gradually return to mesophytic conditions following fire protection and soil improvement. Grasses are characteristic of Savanna whereas in the High Forest grassland is only a transitional type in farm fallow. The succession of grass vegetation in both regions is outlined and its relation to soil development or retrogression indicated.

12.19.4. *Succession*

12.19.4 : 12.19.2 (78 : 79) : 12.25. MUNGER, T. T. **The cycle from Douglas Fir to Hemlock.** *Ecology* 21, 1940 (451–9). [Pacific Northwest Forest Exp. Sta.]

In spite of the predominance of Douglas Fir in southern British Columbia, western Washington, and Oregon, it is not the climax species and will not reproduce in its own shade. Being a light-demanding aggressive species, it forms pure stands after fire or clear cutting, but where such factors are absent Western Hemlock and other shade-bearers invade and ultimately replace it. This general statement is substantiated by actual records of succession in the Douglas Fir region. It is, however, questionable whether Hemlock and species of similar requirements could replace Douglas Fir in the drier and more southerly parts of its natural range, and the climax for these parts is not known. Near the coast Douglas Fir has little place in the forest succession, Western Hemlock and Sitka Spruce predominating in both old and young stands and apparently maintaining their dominance in spite of fire and logging operations.

12.2. *Special* [*Systematic*] *Botany*

12.21. Fungi

12.21 (47.2–6). NIKOLAEVA, T. L. **A contribution to a monograph of some genera of the family Polyporaceae from the European part of the U.S.S.R. and the Caucasus** (*Trametes, Daedalea, Lenzites.*) *Acta Inst. bot. Acad. Sci. U.R.S.S.* 1938 Ser. II (Pl. Crypt.), 1940 (377–431). [R.g.] R.A.M. 20 (234).

A list, with a key and extensive critical notes, of 25 species of *Trametes*, 4 of *Daedalea*, and 5 of *Lenzites*, including some new varieties and forms.

12.21 (729.7). RAYNER, R. W. **Notes on the larger fungi of Trinidad.** *Mem. Dep. Mycol. Bacteriol. Imp. Coll. trop. Agric., Trin.* No. 6, 1941. pp. 11. [Department of Agriculture, Kenya.]

12.21 (79.7). HOTSON, H. H. **The genus *Armillaria* in western Washington.** *Mycologia* 32, 1940 (776–90). R.A.M. 20 (234).

A key is provided to the 15 species of *Armillaria* found in western Washington, incorporating a more or less complete description of each species. This is followed by a discussion of synonymy, habitat, and matters of systematic interest for the individual species.

12.25. Gymnosperms

12.25 (79.4) : 12.19.1. HOWELL, J. T. **The closed-cone Pines of insular California.** *Leafl. West. Bot.* 3 (1), 1941 (1–8). Pl. Sci. Lit. 13 (8), (5).

Includes *Pinus radiata* f. *binata* comb. nov. (*P. insignis* var. *binata*), *P. radiata* f. *guadalupensis* f. nov., and *P. muricata* var. *cedrosensis* var. nov.

12.26-8. Dicotyledons

12.26–8 : 01.2. SMITH, A. C. **Nomenclatural notes on Araliaceae.** *Trop. Woods* No. 66, 1941 (1–6). [Arnold Arboretum.]

The new combinations proposed in this paper comprise 11 transfers from *Gilibertia* to *Dendropanax* and 4 from *Sciodaphyllum* (*Sciadophyllum*) to *Schefflera*. One new species, *Schefflera seibertii*, is described from Panama.

12.26–8 : 01.2. FOSBERG, F. R. **Names in *Amaranthus*, *Artocarpus*, and *Inocarpus*.** *J. Wash. Acad. Sci.* 31, 1941 (93–6). [Bureau of Plant Industry, U.S.D.A.]

Pending international decision on the proposed conservation of the generic names *Artocarpus* and *Inocarpus* against *Sitodium* and *Aniotum* the following new combinations are made:—*Artocarpus altilis* (Parkinson) Fosberg (*A. communis* Forst., *Sitodium altile* Parkinson); *Inocarpus fagiferus* (Parkinson) Fosberg (*I. edulis* Forst., *Aniotum fagiferum* Parkinson).

12.26–8 (51). HU, H. H. **On some interesting new genera and species of Styracaceae in China.** *New Flora and Silva* 12, 1940 (146–60). O.R.S.

Keys are included to the Chinese genera, and to the species of the genus *Rehderodendron*.

12.26–8 (81) : 12.19.1. DUCKE, A. Plantes nouvelles ou peu connues de la région amazonienne. XIe série. **[New and little known plants from the Amazonian region. 11th series.]** *Arquivos do Serviço Florestal, Rio de Janeiro* 1, 1939 (1–40). [F.]

12.26–8 (89). LEGRAND, C. D. Contribución al conocimiento de las Mirtaceas del Paraguay. **[Contribution to our knowledge of the Myrtaceae of Paraguay.]** *An. prim. Reun. Sul-Amer. Bot. Rio de Janeiro 1938*, 3 (105–19); *Trop. Woods* No. 66, 1941 (40).

12.26–8 (95). SMITH, A. C. **Studies of Papuasian plants, II. Monimiaceae.** *J. Arnold Arbor.* 22, 1941 (231–52). [Arnold Arboretum.]

Descriptions are included of new species in the genera *Levieria*, *Idenburgia*, *Anthobembix*, and *Kibara*, all small trees. A new genus, *Isomerocarpa*, is proposed, based on *I. novoguineensis* (Perk.) comb. nov. (*Daphnandra novoguineensis* Perk.), which is a tall tree apparently widely distributed in New Guinea.

12.26–8 (95). MERRILL, E. D., and PERRY, L. M. **Plantae Papuanae Archboldianae, VI.** *J. Arnold Arbor.* 22, 1941 (253–70). [Arnold Arboretum.]

New tree species are described in the genera *Celtis*, *Parasponia*, *Dysoxylum*, *Ilex*, *Perrottetia*, and *Colubrina*.

12.26–8. ROUSSEAU, J. Histoire de la nomenclature de l' *Acer saccharophorum* K. Koch (*A. saccharum* Marshall) depuis 1753. [**History of the nomenclature of *Acer saccharophorum* K. Koch (*A. saccharum* Marshall) since 1753.**] *Contr. Inst. bot. Univ. Montreal* No. 35, 1940. pp. 66. [F.f.e.] [Université de Montréal.] O.B.D.

From a detailed examination of the nomenclatorial history of the true Sugar Maple, hitherto generally known as *Acer saccharum* Marsh., it is concluded that *A. saccharophorum* K. Koch is the valid name for the species. New varietal combinations are proposed.

12.26–8 : 12.19 : 21 : 23 : 24 : 31.0 : 34.2 : 56 : 57. PRASAD, J. **A note on Semal, *Bombax malabaricum* DC.** *Indian For.* 67, 1941 (171–83). [Forest Research Institute, Dehra Dun.]

A general review is presented of the literature on this species. The subjects covered are:—wood properties, uses, and seasoning; utilization of seed floss (kapok) and other minor products; distribution and habitat; phenology; silvicultural characters; natural and artificial regeneration, including seed questions, nursery practice, comparison of different methods of artificial regeneration, and early care and cost of plantations; damage by insect pests and other animals; rate of growth and yield; felling cycle and exploitable size; and timber prices and royalties. A full bibliography is appended.

12.26–8 : 12.14.7 (81). KUHLMANN, J. G. Apreçiacões sistemáticas sobre os frutos do genero *Carpotroche* (Flacourtiaceae). [**Systematic notes on the fruits of the genus *Carpotroche* (Flacourtiaceae).**] *An. prim. Reun. Sul-Amer. Bot. Rio de Janeiro 1938*, 3 (93–6); *Trop. Woods* No. 66, 1941 (38).

The principal fruit characters are made the basis of a key. *C. bahiensis* Kuhlm. sp. nov. is described from fruit alone.

12.26–8 : 21.2 : 31.0. TERRY, M. **The Desert Oak.** *Aust. Timb. J.* 7, 1941 (82–3, 85).

Popular account of *Casuarina decaisneana*, which is widely distributed in dry sandy country in south central Australia. It grows 35–50 ft. in height and has a tough wood which is apparently highly resistant to termites.

12.26–8. CAMP, W. H. **The species problem in *Fagus*.** *Abstr.* in *Amer. J. Bot.* 27, 10, 1940 (22s). [New York Botanical Garden.] O.B.D.

Fagus grandifolia, the Beech of eastern North America, is believed to represent a mixed population resulting from the intermingling of at least two distinct specific entities.

12.26–8 (81). HOEHNE, F. C. **Flora Brasílica.** Vol. 25, Fasc. 3, Nos. 128, 128a. pp. 1–100. Sec. Agr., Ind. e Com. de São Paulo, Brazil. 1941. *Trop. Woods* No. 66, 1941 (39–40).

A monograph of the genus *Machaerium*, including *Drepanocarpus*. A few of the species attain large size in eastern Brazil and are said to be the source of valuable timber commonly known as Jacarandá, a name also applied to *Dalbergia*, particularly *D. nigra* Fr. Allem. The principal timber trees are *Machaerium brasiliense* Vog., *M. firmum* Benth. (the best of all), *M. incorruptibile* Fr. Allem., *M. legale* (Vell.) Benth., *M. nictitans* (Vell.) Benth., *M. opacum* Vog., *M. stipitatum* (DC.) Vog., and *M. villosum* Vog.

12.26–8 (51). METCALF, F. P. **New species of *Mallotus*.** *J. Arnold Arbor.* 22, 1941 (204–8). [Arnold Arboretum.]

Four new species, one new variety, and one new combination, are made in *Mallotus* from China and Indo-China. A key to the '*barbatus*' group of the genus is also included.

12.26–8 (81). DUCKE, A. O genero *Mouriria* Aubl. na Amazonia brasileira. [**The genus *Mouriria* in Brazilian Amazonia.**] *An. prim. Reun. Sul-Amer. Bot. Rio de Janeiro 1938*, 3 (67–74); *Trop. Woods* No. 66, 1941 (38).

An account of the 18 species of *Mouriria* known to occur in this region, including *M. collocarpa* Ducke sp. nov.

12.26–8. CRETZOIU, P. Considerațiuni cu prioire la *Quercus polycarpa* Schur. [**Notes on *Q. polycarpa***.] *Rev. Pădurilor* 52, 1940 (698–703). [Rum.g.]

Description of the tree and indication of its distribution in Rumania.

12.26–8 (83). KAUSEL, E. Un nuevo género de Mirtaceas de Chile. [**A new genus of Myrtaceae from Chile.**] *Rev. Argentina Agron.* 7, 1940 (364). [Span.] Biol. Abs. 15 (13187).

Reicheia, type *R. coquimbensis* (*Myrtus coquimbensis* Barn.).

12.26–8 (728). KOBUSKI, C. E. **Studies in the Theaceae, VI. The genus *Symplococarpon* Airy-Shaw.** *J. Arnold Arbor.* 22, 1941 (188–96). [Arnold Arboretum.]

Descriptions are given of the genus *Symplococarpon* and its species—*S. hintoni* (Bullock) Airy-Shaw, *S. airy-shawianum* sp. nov. (*S. hintoni* Airy-Shaw pro parte), and *S. purpusii* (Brandegee) comb. nov. (*Ternstroemia purpusii* Brandegee), all from Mexico; *S. chiriquiense* sp. nov., from Panama; and *S. multiflorum* sp. nov. and *S. brenesii* sp. nov., from Costa Rica. A key to the species is included.

12.26–8 (81). MOLDENKE, H. N. **New species and varieties of *Vitex* from South America.** *Trop. Woods* No. 64, 1940 (29–40).

Eight new species of *Vitex* from Brazil are described. *V. excelsa* sp. nov., the type of which was collected near Livramento, Municipality Humayta, Amazonas, is a tree up to 200 ft. high with wood resembling that of commercial Teak and extensively used by the natives for boat building.

13.1. *General Zoology*

13.15 : 12.19.2 ADAMS, R. H. **Stratification, diurnal and seasonal migration of the animals in a deciduous forest.** *Ecol. Monogr.* 11, 1941 (189–227).

A detailed study is reported of the movements of invertebrate animals in the young Elm/Maple stage of a deciduous forest climax in Tennessee. It is concluded that in general the animals form stratified communities that are largely restricted to the herb, shrub, and tree layers, respectively. Seasonal migrations from stratum to stratum were observed in spring and autumn, but diurnal movements of this nature were, on the whole, negligible.

13.2. *Special [Systematic] Zoology*

13.2 (410). EMDEN, F. VAN. **Larvae of British beetles. II. A key to the British Lamellicornia larvae.** *Ent. mon. Mag.* 77, 1941 (117–120; 121–7; 181–92). [Imperial Institute of Entomology, British Museum (Nat. Hist.), London.]

13.2 : 45.3. CUSHMAN, R. A. **A review of the parasitic wasps of the Ichneumonid genus *Exenterus* Hartig.** *Misc. Publ. U.S. Dep. Agric.* No. 354, 1940. pp. 14. [Bureau of Entomology and Plant Quarantine, U.S.D.A.]

Fifteen species of *Exenterus*, four of them new, are keyed out and described to facilitate their recognition in work on the biological control of sawflies.

2. SILVICULTURE

2 (43.1–5) : 94.11. WOHLFARTH, E. Die waldbaulichen Richtlinien der deutschen Landesforstverwaltungen. [**The silvicultural instructions of the German State Forest administrations.**] *Allg. Forst- u. Jagdztg.* 116, 1940 (141–63). [G.] Biol. Abs. 15 (11291).

2 (74) : 90. **Report of Committee on Silviculture, New England Section, Society of American Foresters. A silvicultural policy for the hurricane area.** *J. For.* 39, 1941 (376–8).

This report advocates natural regeneration as the principal means of restocking blow-down areas in preference to the establishment of large areas of pure, even-aged stands by planting. It emphasizes the vital importance of adequate fire protection during the period of restocking and suggests certain practices to favour natural reproduction where these can be economically justified. Planting should be used to supplement natural regeneration on certain areas where it is the most efficient means of reforestation. Weeding of natural stands should be delayed as long as possible without causing undue suppression to potential crop trees, and in this and subsequent operations in natural stands, as well as in planting, all aspects of stand composition should receive particular attention with the object of establishing relatively efficient forests.

2 : 12.25 : 57 : 09.1. SCHUMANN, H. Monographie der Lärche, verfasst 1862, auszugsweise wiedergegeben und als forstgeschichtliche Studie bearbeitet von Dozent Dr. habil. Reinhard Schober. [**Monograph on the Larch, written in 1862, reproduced in extract form and edited as a study in the history of forestry by Dr. R. Schober.**] *Thar. forstl. Jb.* 92, 1941 (48–62). [G.]

2 : 12.25 : 11.2 : 11.34 : 11.4. MITSCHERLICH. Das Forstamt Dietzhausen. [**The forest district of Dietzhausen.**] *Z. Forst- u. Jagdw.* 72, 1940 (149–88). [G.] Biol. Abs. 15 (11271).

General silvicultural studies of a Spruce forest on the red sandstone of the southern slope of the Thuringerwald are described, with a discussion of the relation of climate, soil and topography to depth of raw humus, leaching, and growth of the forest. The area is a natural Spruce site. Silver Fir was once fairly plentiful but has practically disappeared where clear felling has been practised. Where precipitation exceeds 800 mm. natural regeneration of Spruce is good; elsewhere planting is better. A spacing of 1·5 × 1·5 m. has given greater height, volume and value increment than closer planting. Interplanting with lupin, broom, and Alder has improved the growth of Spruce on poor sites. Heavy thinning increased both volume and value yields in young stands, but in older stands only value yield was increased. Other species, particularly Silver Fir and Beech, are desirable in mixture up to 10–15 per cent. by area. Pine is not suitable; Larch and Douglas Fir may be worth trying; and Oak is recommended for small groups on favourable sites.

2 : 12.25 : 12.26–8. OLBERG, A. Waldbauliche Erfahrungen in Chorin. [**Silvicultural observations at Chorin.**] *Z. Forst- u. Jagdw.* 72, 1940 (129–49, 193–228). [G.] Biol. Abs. 15 (11274).

The chief tree species of the Chorin forest are Scots Pine (65·2 per cent.), Beech (19·5 per cent.), and Oak (7·6 per cent.). Before the forest was put under management, natural regeneration of Pine was good, being favoured by the presence of hardwoods, especially Oak. Under present conditions, however, natural regeneration is advised only for a few areas where there is considerable Beech. The best artificial regeneration is obtained with full cultivation of the ground. Sowing in strips, where it is possible, is better than planting for high-grade timber production. 1–0 stock is satisfactory for planting except where there is considerable grass. In order to maintain a supply of trees over 40 cm. in diameter it is necessary to reserve trees for a second generation when cutting stands less than 100 years old. Production of quality timber, whether Pine or hardwoods, requires close spacing in youth, thinning, and dry pruning. After about the 30th year the number of stems should be gradually reduced to allow for crown development.

2 : 12.26–8 : 33.0 : 11.47.2 : 11.44. TILLANDER, T. Björkskogen inför det ökade vedbehovet. [**Birch forest and the increased demand for fuelwood.**] *Skogsägaren* 17, 1941 (58–61). [Sw.]

War-time conditions have led to an enormously increased demand for fuelwood in Sweden and there is some danger that Birch may be over-cut. In its younger stages, however, Birch is valuable as a soil improver, since its leaf litter is relatively rich in calcium and readily decays. The thriftiest stands of conifers are those containing a fair proportion of Birch. First-class Birch wood is valued for joinery and for the manufacture of skis, matches, and veneer. It is therefore desirable from both biological and economic points of view to treat Birch with as much care as conifers. With advancing age the soil-improving properties of the litter gradually decrease and the trees are often damaged by rot, besides being liable to injure neighbouring conifers by whipping and rubbing. Thus in older stands it is correct practice to remove most of the Birch, holding over only trees of particularly high quality. No Birch should be left when the stand is to be regenerated, as isolated trees appear to affect reproduction adversely and produce a heavy growth of sprouts when finally cut.

2 : 12.26–8. LAMB, A. F. A. **On the silviculture of Obeche.** *Niger. For.* 1 (2), 1940 (15–20).

Obeche (*Triplochiton scleroxylon*) is one of Nigeria's most important export timbers. The size, growth habit and distribution of this tree are described. Good seed years are irregular and often widely separated. Experiments have shown that seed germinates and plants grow well in the nursery under light shade and with plenty of water, that 1-ft. seedlings produce better saplings than do stump plants, and that Obeche grows better in mixture with *Khaya* or

Gmelina or adjacent to high forest than in pure plantations. In general, experiments with artificial regeneration have been disappointing but good results have been obtained with natural regeneration on an experimental scale by fairly rapid opening of the canopy just before the rainy season. A tendency for Obeche trees to develop poor stem form is believed to be inherent and it is proposed to investigate this possibility as a step towards the improvement of stem form in future stands. Figures are included for the mean annual increment of this species in different areas. It is pointed out that if exploitation continues to be concentrated on this species alone there will be a considerable gap in supplies between the time when overmature stands are exhausted and when a sufficient stocking of second-growth trees is available. This delay could be eliminated if the other component species of the stands were exploited at the same time.

21. SILVICULTURAL CHARACTERS OF TREE SPECIES

21.0 *Adaptability to the General Environment. Acclimatization*

21.0 : 12.25 : 12.19. DANNECKER. Daseinskampf der Weisstanne in ihren Heimatgebieten. **[The Silver Fir's struggle for existence in its native habitats.]** *Allg. Forst- u. Jagdztg.* 117, 1941 (129–48). [G.]

In the writer's opinion—which is substantiated by quotations from other authors—the disappearance of Silver Fir from many of its native habitats in Germany can be counteracted by adopting selection management.

21.0 (71.1). BRITISH COLUMBIA. **Report of the Forest Branch for the year ended December 31, 1940.** King's Printer, Victoria, B.C. 1941. pp. 101.

A plantation consisting of 2,000 trees of 13 exotic species was established in 1927 at Alouette Lake (520 ft. elevation with annual precipitation of 110 in., 16 in. from May to August). The following data were obtained from this plantation in 1940. *Larix dahurica*—survival 84 per cent., largest trees 5 in. d.b.h., appears poorly anchored; *L. occidentalis*—up to 27 ft. in height and 5 in. d.b.h., very thrifty; *L. leptolepis*—a fine tree with high survival; *Pinus sylvestris*—survival 95 per cent., up to 19 ft. in height and 4·9 in. d.b.h.; *P. resinosa*—largest tree 19 ft. high and 4·6 in. d.b.h.; *Sequoia gigantea*—survival 51 per cent., up to 18 ft. in height and 4·8 in. d.b.h.; *Pinus ponderosa*—up to 19 ft. in height and 4·5 in. d.b.h., growth not uniform, susceptible to loss of leader and killed by light fire at 12 years; *Fraxinus americana*—survival 80 per cent., up to 24 ft. in height and 2·1 in. d.b.h.; *Acer saccharum* and *Quercus borealis* close behind this, the latter species being resistant to damage by light fire. The best-growing trees of native hardwoods of same age exceeded exotics in rate of growth, e.g. *Betula occidentalis*—up to 33 ft. in height and 5·6 in. d.b.h. (p. F18).

21.2. *Moisture Requirements. Water régime*

21.2 : 12.26–8 : 21.3. KOKINA, S. I., and POPOVA, Z. T. **The influence of salinity and moisture of the sand upon the development and resistance of tree and shrub seedlings in the Karakum Desert.** *Bot. Zh.* 25, 1940 (532–62). [R.g.] A.P.B.

In the pot experiments described the principal aim was to gain further data on the salt and drought resistance of *Haloxylon persicum* Bge. and *H. aphyllum* (Minkw.) Iljin as evidenced by seedling behaviour under controlled conditions. The two species not only tolerated salt concentrations (NaCl, Na_2SO_4 and $MgSO_4$ in a ratio of 1 : 2 : 1) up to 1 and 2 per cent., respectively, but their drought resistance was improved by the presence of salt. In its absence *H. aphyllum* was more sensitive to a decrease of the soil humidity from 13 to 7 per cent. than *H. persicum*. Both species are characterized by low intensity of transpiration and high osmotic pressure.

21.3. *Soil Requirements*

21.32 : 12.25 : 23.1 : 11.42 : 23.26.4 : 23.23.19. CHAPMAN, A. G. **Tolerance of Shortleaf Pine seedlings for some variations in soluble calcium and H-ion concentration.** *Plant Physiol.* 16, 1941 (313–26). [Central States Forest Exp. Sta.] O.B.D.

Germinating seed and young seedlings of *Pinus echinata* failed to survive in culture media with a soluble-Ca content of about 500 p.p.m. or more and a pH of about 6·5 or more, or with either of these factors taken separately. The possible nature of the toxic effects of high soluble-Ca and low hydrogen-ion concentrations on the root cells is briefly discussed.

High Ca content of the soil may prevent natural reproduction in planted stands of this species, increase the cost of soil management in nurseries, and vitiate the results of germination tests.

21.32 : 12.26–8 : 11.4. KAWASHIMA, R., and SUYAMA, G. **On the reaction and lime status of Japanese Chestnut orchard soil.** *J. Sci. Soil Japan* 14, 1940 (143–7). [Jap.e.] S. & F. 4 (170).

It is shown that the Japanese variety of Chestnut is a calcifuge.

21.32 : 12.26–8 : 11.42.1. **What's new in farm science. Part 2: Annual report of the Director, Agricultural Experiment Station, University of Wisconsin, Madison.** *Bull. Wis. agric. Exp. Sta.* No. 449, 1940. pp. 96.

Yellow Birch thrives on a soil that is highly acid, is relatively low in phosphorus and potash, and has a ratio of nitrogen, phosphoric acid and potash of about 1–2–5, while Hard Maple, Basswood, American Elm and White Ash require a soil that is nearly neutral, has a high level of bases and phosphorus, and a ratio of nitrogen, phosphoric acid and potash of about 1–3–5 (p. 18).

21.6. *Behaviour in the Stand*

21.62 : 12.26–8 : 24.5. VOSS. Erste Ergebnisse eines Versuches, der Wasserreiserbildung bei Eiche vorzubeugen. [**Preliminary results of an experiment to prevent the formation of epicormic shoots on Oak.**] *Z. Forst- u. Jagdw.* 73, 1941 (41–7). [G.g.]

In a small-scale experiment initiated 4 years ago, removal of the outer bark to a height of 5–8 m. before freeing the trees by means of a heavy thinning has so far checked to a great extent the formation of epicormic shoots. It appears, however, that the treated stems are more susceptible to frost-rib formation than the controls. Treatment cost 1 RM. per stem.

21.63 : 12.25 : 56.01 : 12.11.23. WAGENKNECHT, E. Das Umsetzen in Kieferndickungen. [**Changes in young plantations of Scots Pine.**] *Z. Forst- u. Jagdw.* 72, 1940 (285–96). [G.] Biol. Abs. 15 (13462).

Observations made in two young plantations of Scots Pine in 1931 (6 years old) and 1937 showed that by the latter date 87 per cent. of the trees that were 10 cm. or more taller than their neighbours in 1931 had maintained or increased their lead, while 86 per cent. of those that were 10 cm. or more shorter had dropped farther behind or died. Most of the trees that were 30–40 cm. ahead at the sixth year had about three times as great a lead at the twelfth.

21.9. *Longevity*

21.9. CLEPPER, H. **Giant trees of the world.** *Nature Magazine, Washington* 33, 1940 (515–9). L.S.

A popular illustrated article on the world's tallest tree species.

21.9 : 12.25. SCHULMAN, E. **Notes on long-lived Ponderosa Pine. An over-age stand in the Sierra Nevada.** *J. For.* 39, 1941 (411–3). [University of Arizona, Tucson.]

22. SILVICULTURAL SYSTEMS. FORMS OF STAND

22.14. ROTH, G. Vonalas szálalás ill. vonalas szálaló vágás. [**The line selection system and line selection fellings.**] *Erdész. Kisérl.* 42, 1940 (203–24). [Hu.g.]

The system described is a modification of Wagner's Blendersaumschlag, from which it differs in two respects: fellings proceed at right angles to the line of attack in both directions instead of only one; and the lines of attack are laid out in such a manner as to facilitate the extraction of timber, instead of always running east and west. The writer obtained satisfactory regeneration when applying his line selection system on an experimental scale in a number of coniferous and broadleaved stands in Hungary.

22.14.2 : 95.1. WILLISON, C. H. **Ad valorem property tax advantages of selective cutting.** *Timberman* 42, 1940–41 (14–5).

Figures are given for the present value of *ad valorem* taxes to be paid for 40 years on a sample forest tract in Oregon under different conditions of management, the comparison being made between selective cutting and clear cutting under the three alternatives (1) liquidation and land forfeiture, (2) retention of land on property tax rolls, and (3) classification of land under the reforestation tax law. In each case the total amount of tax is less for a selectively cut property under the conditions cited, the basis of selection being the removal of trees of relatively high stumpage value with the possibility of an annual reassessment of the value of the remaining stand.

22.88.1 (74.6) : 42.1. RAUP, H. M. **An old forest in Stonington, Connecticut.** *Rhodora* 43, 1941 (67–71). [Arnold Arboretum.] O.B.D.

Evidence from a study of annual rings in trees blown down by the hurricane of 1938 indicates that the reputedly virgin forest at Stonington, Connecticut, suffered previous hurricane damage in 1815, and that much of the present stand originated at that time from seedlings, sprouts or advance growth. There was no indication of disturbance during the period 1815–1938.

23. FORMATION OF STANDS

23 : 24 : 44.0 (66.9). NICOL, A. K. F. **Silvicultural research in Ondo Circle.** *Niger. For.* 1 (2), 1940 (54–8).

In a quotation from a note by the Chief Conservator of Forests for Nigeria it is pointed out that following logging operations or other opening of the canopy of the rain forest a widespread invasion of creepers takes place that interferes markedly with the establishment of regeneration, and that the future trend in silviculture in this forest will be toward clear cutting followed by the clearing and burning of the debris on the area with natural or artificial regeneration possibly accompanied by the growth of agricultural crops.

The experiments described are concerned largely with creeper cutting to determine cost data, which is the significant factor, with finding existing regeneration, and studying the effect of creeper cutting on regeneration, and also with the effect on natural regeneration of the more intensive treatment of corridors in the high forest from which creepers, lower-storey shrubs and ground cover were removed and burned. The preliminary work has been completed, and after six months the most striking feature is the variation of growth in relation to light conditions, seedlings of a number of tree species and some herbaceous creeper growth being found under the wider gaps in the canopy while in shadier parts only shrub coppice and patches of seedlings of *Diospyros* sp. are in evidence.

23.1. *Natural Regeneration*

23.1 : 12.19.2 : 12.25. HAIG, I. T., DAVIS, K. P., and WEIDMAN, R. H. **Natural regeneration in the Western White Pine type.** *Tech. Bull. U.S. Dep. Agric.* No. 767, 1941. pp. 98. [Northern Rocky Mountain Forest & Range Exp. Sta.]

This bulletin summarizes the available information on natural regeneration of the Western White Pine type of northern Idaho and contiguous portions of Washington, Montana, and British Columbia, based on about 25 years of research and 30 years of management experience. Sixty-eight references are cited.

23.1 : 12.19.2 : 12.25 : 42.1. BALDWIN, H. I. **Natural regeneration of White Pine lands following the hurricane.** *Fox For. Notes* No. 21, 1940. pp. 2.

An examination in September, 1940, of milacre plots in a small area of hurricane-damaged forest indicated adequate restocking, although scattered small patches showed no seedlings, much of the reproduction was of less desirable species, and many seedlings and sprouts of the better species were badly deformed and suppressed. Species composition of the reproduction varied with soil type. Recommendations are made for the restoration of blow-down areas to productive forest.

23.1 : 12.25. MACBEAN, A. P. **A study of the factors affecting the reproduction of Western Hemlock and its associates in the Quatsino region, Vancouver Island.** Forest Branch, Department of Lands, Victoria, B.C. 1941. pp. 36. [British Columbia Forest Service.]

At least 82 per cent. of the cut-over lands in the area examined are satisfactorily stocked under present management standards, which take into account the presence of logging slash and underbrush following logging, leading to reduced reproduction in small areas and preventing the formation of a uniformly closed stand.

Hemlock (*Tsuga heterophylla*) is the principal commercial tree in the region and the chief component of reproduction, with a strong inherent reproductive capacity. It produces abundant cone crops at fairly frequent intervals, the seed is small and thus protected from birds and rodents, and is effectively disseminated by the wind. The seed germinates on a fairly thick layer of humus and rotten wood, and good survival depends on the mild, moist summer climate characteristic of the region. Seedlings are tolerant to a wide range of light conditions. It is suggested that satisfactory regeneration can be secured either by clear cutting or under some form of selection cutting, and as it has been found that the proportion of reproduction

established after logging to advance growth increased with number of years following logging up to possibly 80 per cent. of the total at the end of 10 years, it is apparent that clear-cut areas should not be too large. While burning after logging improves conditions for regeneration it delays establishment for several years, and repeated fires may lead to conditions entirely unsatisfactory for regeneration. Ease of establishing reproduction, rapid growth, and other conditions make this region suitable for continuous forest production. *From author's summary.*

23.1 : 12.25 : 11.42.31. BEER, F. Die Tanne, eine sterbende Holzart? **[Silver Fir, a dying tree species?]** *Dtsch. Forstw.* 22, 1940 (767–70). [G.] Biol. Abs. 15 (13407).

Improper silvicultural treatment is mainly responsible for the failure of *Abies alba* to reproduce in many parts of Germany. On upland granite and gneiss soils, where openings in the stand show high acidity in the upper soil horizons, the seedling roots are unable to penetrate and most of the seedlings die in a few years. Single-tree selection is the only way to maintain the species. At lower levels the soil is less acid and, except on clear-felled areas, reproduction is abundant and persistent in spite of heavy browsing. On limestone soils reproduction is abundant except under even-aged stands.

23.1 : 12.25 : 12.26–8 : 22.14.1. DANNECKER, K. Rückgang wertvoller Holzarten und Bestandestypen im Wirtschaftswald? **[Retrogression of valuable tree species and stand types in the economic forest?]** *Dtsch. Forstw.* 22, 1940 (477–80; 494–6; 505–8). [G.] Biol. Abs. 15 (11249).

The decrease in the proportion of Silver Fir (*Abies alba*) in systematically managed German forests is largely a consequence of clear felling or other systems in which the canopy is removed too soon after the establishment of reproduction. Selection management is the best means of maintaining the stocking of this species, as it reproduces well only under a shelterwood and needs a reproduction period of 30–40 years. In many localities the same is true of Beech. Oak does best in fairly open, all-aged stands and even Pine yields higher-quality timber when grown in selection forest.

23.1 : 12.25 : 22.88.1 (43.7). FRÖHLICH, J. Der Fichtenurwald an der oberen Waldgrenze in den Ostkarpathen. **[The virgin Spruce forest of the timberline in the East Carpathians.]** *Cbl. gesamte Forstw.* 66, 1940 (125–31). [G.] Biol. Abs. 15 (13422).

Spruce reproduces with difficulty near its upper limit in the Carpathians. It will not reproduce under shade, and in accidental openings in the stand rapid invasion by grass prevents the establishment of seedlings, which survive only on rotting logs.

23.1 : 12.25. UNITED STATES. **Twentieth annual report of the Southern Forest Experiment Station, January 1, 1940–December 31, 1940.** New Orleans, La. [1941]. pp. 39.

Conditions necessary for the satisfactory reproduction of Shortleaf and Loblolly Pines have now been determined and include the presence of ten good seed trees per acre for prompt reproduction and three for good reproduction over a period of several years (p. 12).

23.1 : 12.25 : 43 : 12.19.4. MAYALL, K. M. **Interim report. White Pine succession as influenced by fire.** National Research Council of Canada, Ottawa. *N.R.C.* No. 989, 1941. pp. 29 + maps.

A survey of seven widely distributed areas in White Pine cover types in the Ottawa Valley Region was carried out in 1939–40 with the object of obtaining fundamental data on conditions of natural regeneration and possibly of providing a basis for the improvement of methods of management. It included the study of (*a*) present conditions of regeneration on cut-over and burned-over stands, (*b*) the significance of fire and other factors in influencing Pine regeneration, and (*c*) the probable succession of natural vegetation. From results so far obtained it is concluded that: (1) White Pine regeneration on cut-over and burned-over lands is insufficient for future requirements. (2) White Pine in the tolerant hardwood cover type is no longer significant. (3) There are not sufficient seed trees after cutting. The maximum number of seedlings is not greater than double the number of the stand present prior to cutting and that is inadequate. (4) Burning in stands of mature timber stimulates regeneration while results of fire in young stands are doubtful. *From author's summary.*

23.1 : 12.26–8 : 23.6 : 22.82 : 22.83. KÜNANZ, H. Gründung und Jungwuchspflege reiner und mit Nadelholz gemischter Buchennaturverjüngungen. **[Establishment and early care**

of natural regeneration of Beech, pure or mixed with conifers.] *Forstarchiv* 17, 1941 (111–4). [G.]

General recommendations from German experience.

23.1 : 12.26–8. De, R. N. **Sal regeneration *de novo*.** *Indian For.* 67, 1941 (283–92).

From experiments undertaken in Kamrup and Goalpara Divisions in Assam it is concluded that: (1) Rains weeding is the first and most effective factor in Sal regeneration. (2) Burning is not invariably a silvicultural necessity for Sal regeneration though it may be necessary to induce cattle to graze existing thatch (*Imperata arundinacea*). Burning does not depauperate this grass. (3) Grasses are not indicators of Sal soil nor is their introduction necessary to establish Sal regeneration. (4) Sal regeneration can be established under both open and close canopy, although in the latter case the canopy must be opened gradually as too much opening induces weeds and grass which choke out the seedlings. (5) *Eupatorium odoratum* acts as a nurse for Sal natural regeneration in its early stages of development. *From author's summary.* [Cf. *For. Abs.* 2 (295), 3 (43).]

23.13 : 12.25 : 45.11 : 34.21 : 24.36. Gemmer, E. W. **Loblolly Pine establishment as affected by grazing, overstory, and seedbed preparation.** *J. For.* 39, 1941 (473–7). [U.S. Forest Service.]

The results of this study indicate that for purposes of establishing Loblolly Pine reproduction cattle grazing should not be permitted on the area during the spring and fall following a seedfall, and that the mineral soil should be partially exposed before seedfall by cultivation or raking the litter or by other effective means. It was found that both the most dense and least dense overstoreys gave better germinating conditions than did medium density, although survival of seedlings was reduced by heavy overstoreys.

23.2. *Artificial Regeneration*

23.2 : 12.25 : 76.1 : 33.0. Armbruster, H. Kiefern-Kulturen und Sortenziele im Forstamt Neuruppin. [**Artificial regeneration of Scots Pine as related to the category of timber aimed at in the forest district of Neuruppin.**] *Forstarchiv* 17, 1941 (93–6). [G.]

Pine destined to produce timber of superior quality is planted more closely, thinned less during its youth, and grown on better soils than that intended for the production of ordinary building timber. Production of knot-free timber precludes the admixture of Oak and Beech until the pole stage is reached.

23.22. Preparatory Work. Auxiliary Measures

23.22 : 12.19.22 : 23.24 : 12.25 (75 : 76). Minckler, L. S. **Interplanting of Laurel and Rhododendron thickets with White Pine.** *Tech. Note Appal. For. Exp. Sta.* No. 46, 1941. pp. 3.

An investigation to determine the site preparation necessary to ensure the establishment of White Pine seedlings in Laurel thickets showed that (*a*) White Pine can keep ahead of Laurel and Rhododendron sprouts that result from cutting the thickets, and (*b*) a complete clear cut of thickets is not always essential. Based on these facts recommendations are made for interplanting.

23.22.1 : 11.41.3 : 11.48.2. Heinrich, F. Untersuchungen über den Einfluss des Vollumbruchs auf den Wasserhaushalt diluvialer Talsande. [**Research on the influence of full ploughing on the water régime of diluvial valley sands.**] *Forstarchiv* 17, 1941 (88–93). [G.g.] [Bodenkundliches Institut der Forstlichen Hochschule Eberswalde.]

In the investigation described, comparative data were obtained on the moisture content of the soil during April to November in (1) a full-ploughed plot and (2) a strip-ploughed plot, under furrows that were free of ground vegetation. On an average the top 1 m. of the soil was moister under the furrows of the strip-ploughed plot, though the uppermost 30 cms. contained more moisture in the full-ploughed plot. It therefore appears that, apart from the favourable effect of full ploughing on the establishment of plantations due to the complete destruction of forest weeds, the change in the water regime that is brought about in diluvial valley sands is of dubious value.

23.22.1 : 12.25 : 12.26–8 : 21.64. McLintock, T. F. **Effects of ground preparation on survival and growth of planted Pine and Black Locust.** *Tech. Note cent. St. For. Exp. Sta.* No. 23, 1940. pp. 4. [C.C.C.]

It is shown that at the end of the first 5-year period after planting the height growth of Pitch and Shortleaf Pines and Black Locust seedlings was consistently better on ploughed than on unprepared land and survival of both Pine species was best on ploughed land. Results from furrowed land were usually intermediate. While ground preparation is not feasible in most planting operations, it is suggested that it may determine the success of the work on certain critical areas.

23.22.1 : 23.23 : 12.26–8 : 24. SACHENBACHER, T. Über Eichenwirtschaft. [**On the silviculture of Oak.**] *Forstarchiv* 17, 1941 (155–8). [G.]

Notes on the regeneration by sowing of Oak in Bavaria. A common procedure is to select a plot of 3 to 12 ha. in old Beech and clear it of all but a few seedbearers, which are left to provide for the desired admixture of Beech. The plot is then sown with Oak. This method is criticized on the grounds that it often results in wind damage, sun scorch, and unsatisfactory regeneration in the margins of the surrounding Beech. It is therefore suggested that the regeneration of the Oak be delayed until that of the Beech is assured and that the Oak be regenerated in strips.

23.22.2. DURANT, C. L. **Vegetable cultivation as an aid to forest improvement.** *Malay. For.* 10, 1941 (48–54).

An experiment is described in which plantations of *Intsia palembanica* mixed with various tree and bush covers were successfully formed in conjunction with the cultivation of vegetables in market gardens by Chinese squatters. *Author's summary.*

23.22.2 : 12.25 : 11.48.7 : 11.47 : 76. KRIEGER, H. Über Versuche, bei der künstlichen Nachzucht von Fichtenbeständen auf sehr feinkörnigen Böden das Sitzenbleiben der Kulturen zu vermeiden. [**On experiments to avoid the stagnation of plantings in the artificial regeneration of Norway Spruce stands on soils of very fine texture.**] *Forstarchiv* 17, 1941 (96–109). [G.]

The insufficient aeration and extreme lime deficiency of these soils were counteracted by agricultural cultivation combined with liming. The formation of a close canopy was attained in 7 instead of 11 years by planting potatoes in the first year, and perennial lupins in the following year, between the rows of Spruce.

23.23. Sowings

23.23.1. *Seed Procurement, Treatment, and Testing*

23.23.1 : 12.26–8 : 12.11.21. GUARD, A. T., and WEAN, R. E. **A study of the quality of *Liriodendron tulipifera* seed produced under various conditions.** *Abstr.* in *Amer. J. Bot.* 27, 10, 1940 (4s–5s). [Purdue University, West Lafayette, Ind.] O.B.D.

Seed collected at three levels on trees in six counties in Indiana was cut to determine the percentage of filled seed. Different levels of the same tree showed small variations in good seed. Wide differences in seed quality were shown by individual trees, and significantly more good seed was produced by cross-pollinated than by selfed flowers. [Cf. *For. Abs.* 2 (295).]

23.23.1 : 45.3 : 12.25 : 13.2. WOLFF, M., and JENSS, O. Zur *Megastigmus*-Frage. [**On the *Megastigmus* problem.**] *Z. Forst- u. Jagdw.* 73, 1941 (113–36). [G.]

Chiefly a survey of the available information on the species of *Megastigmus* that attack the seed of conifers, particularly their hosts, biology, and control.

23.23.11 : 12.25 : 23.13 : 12.11.21. VINCENT, G. Lze pěctebními zásahy podořit plodnost lesních dřevin? [**Can silvicultural measures stimulate the fruiting of forest trees?**] *Lesnická Práce* 19, 1940 (221–39). [Cz.g.] Biol. Abs. 15 (11289).

The seed production of a number of Pine, Spruce and Larch trees in Czechoslovakia was generally low after a wet or very dry year, and after a wet May or growing season. It was largest after a year of slightly subnormal precipitation, or after a dry May or growing season. Partial or complete girdling of several Pine and Spruce at breast height or just below the crown in no instance increased seed production compared with that of equally vigorous ungirdled trees. Satisfactory seed production in stands can best be assured by repeated heavy thinning, beginning at least 20 years before natural regeneration is to start, so as to develop vigorous crowns.

23.23.12 : 12.26–8 : 45.3. KAMALAPUR, V. R. **The collection of Khair (*Acacia catechu*) seed.** *Indian For.* 67, 1941 (261).

Seed of *Acacia catechu* collected in Poona at about the end of April, 1939, when the pods were quite dry, was found to be mostly

damaged by insects. During observations in the subsequent year no insect attack appeared until the pods began to dry, and seed collected from pods that had only just ripened and were still yellowish in colour was sound and germinated profusely.

23.23.13 : 07.7. FILIPOVICI, I. Un proect de maşină pentru desariparea seminţelor forestiere. **[Design for a machine for de-winging forest seed.]** *Rev. Pădurilor* 53, 1941 (85–6). [Rum.]

23.23.13 : 07.7 : 12.25. RIETZ, R. C. **Kiln design and development of schedules for extracting seed from cones.** *Tech. Bull. U.S. Dep. Agric.* No. 773, 1941. pp. 69. [Forest Products Laboratory, Madison, Wis.]

The steam-heated drying kiln constructed at the Forest Products Laboratory in Madison, having forced air circulation and temperature control, is described. It is shown that these kilns increase the efficiency of seed-extraction procedures. The practicability of the installation is determined by the volume of cones to be dried, their cost, labour costs, and the value of the seed obtained. It is thought that both public and private agencies producing conifer tree seed can economically use the equipment when the cone volume handled is approximately 5,000 bushels per year. As a complement of the cone kiln, good cone-storage facilities are required. Cones of species such as Longleaf, Slash, Shortleaf, Lodgepole, Eastern White, and Red Pine respond to air drying, thereby reducing the time required to kiln dry them to low moisture content. It is shown, however, that the modernized kiln equipment is capable of efficiently drying relatively moist cones without danger of seed injury. A definite relation exists between water loss and degree of cone opening, e.g. Jack Pine cones may be expected to release good volumes of seed when dried to a moisture content of 5 per cent., and Eastern White and Red Pine cones when dried to 6 per cent. Rapid drying to these low cone-moisture conditions is in the interest of economy and requires that a low equilibrium moisture content be maintained in the kiln. Provisional drying schedules for Eastern White, Jack, and Red Pine are presented for use with the Forest Products Laboratory cone kiln, together with a schedule for Longleaf Pine for a kiln of similar design but larger capacity.

23.23.15 : 11.11. BRITISH COLUMBIA. **Report of the Forest Branch for the year ended December 31st, 1940.** King's Printer, Victoria, B.C. 1941. pp. 101.

Experiments have shown that while temperature is of great importance to the germination of dry-stored seed, it is unimportant to the germination of naturally-sown seed that has overwintered on the ground or of seed that has been stratified before artificial sowing (p. F17).

23.23.19. ROHMEDER, E. Erfahrungen mit dem 'Selenverfahren' bei der Untersuchung des forstlichen Saatgutes. **[Experience with the selenium method in research on forest seed.]** *Allg. Forst- u. Jagdztg.* 116, 1940 (169–88). [G.] Biol. Abs. 15 (11279).

Results from several years of seed testing by the selenium method are compared with laboratory and field germination tests for Douglas Fir, Spruce, Scots Pine, White (Weymouth) Pine, Larch, Beech, Oak, and Walnut. The approximate viability of the seed of most species can be predicted by the selenium method, but so far this is not true of Oak. The vigour of the seed, hitherto determined by rapidity of germination and ability to push through a 10-mm. covering of coarse sand, can also be predicted with fair accuracy by the selenium method. The plant percentage cannot yet be predicted accurately by this method, though it gives a 'plant potential' that is definitely related to the number of plants that can be raised.

23.23.19. FLEMION, F. **Further studies on the rapid determination of the germinative capacity of seeds.** *Contr. Boyce Thompson Inst.* 11, 1941 (455–64).

Previous work on the determination of germinative capacity by observing the behaviour of excised embryos has been extended to 24 additional species, including conifers and broadleaved trees. The method consists in placing the excised embryos on moist filter paper at room temperature, under which conditions the non-viable embryos deteriorate within about 10 days while the viable ones either remain intact or show signs of development. Close agreement has been obtained between the germinative capacity thus determined and the results of actual germination tests; the method is, therefore, suitable for the rapid determination of germinative capacity in seeds for which ordinary methods would be far too prolonged. Excision of the embryos is the only stage at which difficulties may be encountered, but it has been shown that different kinds of pretreatment, such as acid treatment, cracking the

outer coat, a short storage period in moist peat moss, partial after-ripening of the embryos, etc., will usually overcome this difficulty for seed of any particular species.

23.23.19 : 12.11.21 : 11.11. Roe, E. I. **Effect of temperature on seed germination.** *J. For.* 39, 1941 (413–4). [Lake States Forest Exp. Sta.]

Seed of deciduous species that give very poor germination under usual laboratory conditions showed a striking response to variation in temperature from the conventional 68° F. (night) to 86° (day). Thus *Acer negundo*, after stratification for 90 days at 41°, gave best results at temperatures of 50° (night) to 77° (day), *Prunus americana* and *P. alleghaniensis davisii* at a constant 50°, and *Acer platanoides* at a constant 41° F.

23.23.19 : 12.25. Baldwin, H. I., and Flemion, F. **Rapid method for testing White Pine germination.** *Fox For. Notes* No. 30, 1941. p. 1.

A good estimate of the actual germinative energy of White Pine (*Pinus strobus*) seed was obtained within 10 days using the excised embryo test in which seeds were mixed in moist peat and held at room temperature for 5 days, then the embryos were removed and placed on moist filter paper in Petri dishes and allowed to develop for 5 days, when the embryos were classified as 'very vigorous,' 'less vigorous,' or 'deteriorated'.

23.23.19 : 12.25. Allen, G. S. **A standard germination test for Douglas Fir seed.** *For. Chron.* 17, 1941 (75–8). [British Columbia Forest Service.]

Complete germination can be obtained in about twelve days from seed that has been stratified for six to eight weeks in moist sand at a temperature just above the freezing point. After stratification the seed is washed, sterilized, washed again, and germinated on the surface of sterilized sand in a humid atmosphere at about 20° C. *From author's summary.*

23.24. Formation of Stands by Planting

23.24.1. *Planting Material*

23.24.1 : 07.7. Nordmann, C. F. Pflanzentransport im Hochgebirge. **[Transport of planting stock in the mountains.]** *Forstarchiv* 17, 1941 (109–11). [G.]

The plants are carried by means of a special wooden back-pack equipment commonly used in the Riesengebirge to carry loads to high altitudes.

23.24.1 : 12.26–8. Rayos, J. A. **Preliminary study on the survival of wild bare-rooted Dalingdiñgan seedlings stored in sawdust.** *Philipp. J. For.* 3, 1940 (417–23). [Bureau of Forestry, Philippines.]

A fair percentage of survival was obtained by storing *Hopea pierrei* seedlings with their roots sandwiched in moist sawdust. Survival was the higher the shorter the storage period and was always greater for seedlings 10–20 cm. high than for those in other height classes.

23.24.1 : 12.26–8. Bull, H. **Cottonwood wildings make good planting stock.** *Sth. For. Notes* No. 37, 1941 (1).

Wildings 1½ to 7 ft. tall and mostly 2 years old were pulled up without digging, and root trimmed sufficiently to allow planting in holes ½ in. in diameter on typical bottomland hardwood sites. Best first-year survival (52–68 per cent.) followed the pulling and planting of wildings in the dormant period, with tops cut back to 18–24 in. for planting in a swamp, and unpruned for planting on a ridge.

23.24.1 : 12.26–8 : 21.64 : 12.11.2. Bull, H., and Putnam, J. A. **First-year survival and height growth of Cottonwood plantations at Stoneville, Miss.** *Occ. Pap. Sth. For. Exp. Sta.* No. 98, 1941. pp. 16.

From early results on clay soils during one abnormal growing season it is concluded that Cottonwood wildings (wild seedlings) are better than cuttings for planting stock, that seedlings should be about 2 years old, 4–7 ft. high, and with roots at least 10 in. long, that they should be collected and planted in the dormant season, or collected early and held in cold storage for planting later, and that they should be cut back to about 18–24 in. just after planting in swamps and low flats, and to abour 4 in. or not at all when planted on ridges or high flats, depending upon the time of planting. A spacing of 6 ft. by 6 ft. is recommended and early clearings are desirable. Cuttings may be used if seedlings are not available. For ridges and high flats they should be 20 in. long and planted 16 in. deep, while in swamps and low flats they should be 60 in. long and planted 24 in. deep, the stock to be collected and planted in the dormant season. It is preferable that cuttings should not include the terminal buds. *From authors' summary.*

23.24.1 : 12.26–8 : 21.64 : 12.11.2. BULL, H., and PUTNAM, J. A. **Early survival of Cottonwood and hybrid Poplar plantations at Stoneville, Miss.** *Occ. Pap. Sth. For. Exp. Sta.* No. 94, 1940. pp. 7.

From a preliminary examination of the plantings it appears that (*a*) the hybrid Poplars have varied widely in survival from 36 to 97 per cent., (*b*) Cottonwood seedlings give a higher survival than do cuttings of this species, (*c*) Cottonwood seedlings or cuttings should be planted during the dormant period or held in cold storage (35° F. used) if planted after the dormant period, (*d*) Cottonwood seedlings should be cut back to 24 in. or less soon after planting, and (*e*) the effect of site on survival was closely correlated with date of planting.

23.24.2. *Methods of Planting*

23.24.2 : 12.26–8. PATO, M. **Relative efficiency of earth-balled and bare-rooted methods of transplanting Pili seedlings.** *Philipp. J. For.* 3, 1940 (425–9). [Puerto Princesa, Palawan, Philippines.]

With two-year-old seedlings ball planting gave considerably higher survival but a somewhat higher cost per living plant than did the bare-rooted method. Both methods were fairly expensive and it is thought that the cost might be reduced by transplanting *Canarium ovatum* seedlings at a younger age.

23.24.2 : 64. SOUTH AUSTRALIA. **Woods and Forests Department. Annual report for the year ended 30th June, 1940.** Govt. Printer, Adelaide. 1940. pp. 16.

Investigation has shown that the care of roots at time of planting is an important factor in determining success on poor sites but has no significant effect on better sites (p. 10).

23.24.3. *Spacing*

23.24.3 : 12.25 : 57. UNITED STATES. **Twentieth annual report of the Southern Forest Experiment Station, January 1, 1940–December 31, 1940.** New Orleans, La. [1941.] pp. 39.

Closely spaced (5 ft. by 5 ft.) Slash Pine plantations gave results superior to those of wider spaced (8 ft. by 8 ft. and 6 ft. by 6 ft.) plantations in yields from thinnings, number and size of residual trees, wood quality, natural pruning, and ease of marking and removal of thinnings (pp. 13–4).

23.26. Plant Rearing. Nursery Practice

23.26 : 07.7. TAMAI, T. **Two types of auto-irrigated nursery.** *Bull. Sch. Agric. For., Taihoku* No. 2, 1941 (120–35). [Jap.e.]

The auto-irrigators described allow of controlling soil moisture in fairly large greenhouses, a regulated supply of water being admitted to the soil from below through a porous clay structure. One of the two irrigators can be heated, if desired, either electrically or by means of fermenting manure.

23.26 : 12.25 : 12.26–8 : 23.23.3. CANADA. **Report of the Lands, Parks and Forests Branch for the fiscal year ended March 31, 1940.** *Repr.* from the Annual Report of the Department of Mines and Resources, pp. 60–135. King's Printer, Ottawa, 1941.

Investigations into nursery and planting technique at the Petawawa Forest Experiment Station have shown that (1) Pine should be sown in the autumn and Spruce in the spring, (2) germination of Basswood seed requires two to four years, and (3) sawdust mixed in heavy soils improves seedbed conditions for Spruce and Pine (p. 118).

23.26 : 12.26–8 : 23.23.3. BRITISH GUIANA. **Report on the Forest Department for the year 1939.** Govt. Printer, Georgetown, Demerara. 1941. pp. 9.

Germination of the seed of Crabwood (*Carapa guianensis*) was successful in a compact sandy loam but failed in a loose light brown sand (p. 6).

23.26 : 12.26–8 : 12.11.15. COORG. **Progress report of the Forest Administration in Coorg for 1939–40.** Mysore Residency Press, Bangalore. 1941. pp. 50.

Results from a single experiment indicate that treatment with Seradix A promotes early root formation on Teak stumps and the development of stumplings (p. 8).

23.27. Arboriculture

23.27 : 60.2 (54). PARKER, R. N. **Arboriculture along roads and canals.** *Punjab For. Rec.* 1 (8), 1940 (1–7).

A brief guide to planting along roads and canals in the Punjab.

23.3. *Afforestation*

23.3 (494) : 11.62.11. BADOUX, H. Quelques indications sur les travaux de boisement

effectués dans le canton de Fribourg, à partir de 1890. **[Notes on afforestation in the Canton of Fribourg from 1890 onwards.]** *J. for. suisse* 92, 1941 (49–52). [F.]

About one-half of the area of the previously denuded Höllbach and Aergera Basins has been afforested in the last 50 years, the total plantation area now exceeding 1,000 ha. Inundations and erosion have been checked as a result of this work.

23.3 (729.1). Fors, A. J. Informe sobre plantaciones forestales en Cuba. **[Report on forest plantings in Cuba.]** *Carib. For.* 2, 1941 (138–40). [Span.e.]

Since the Ministry of Agriculture has limited its forestry activities to the spreading of information and the distribution of seeds and seedlings, existing plantations in Cuba belong exclusively to private owners. Spanish Cedar has been used in almost all plantations because of its rapid growth and a ready market for its timber. This tree has often been planted on unfavourable soils, in pure stands or in single lines, and has been heavily attacked by the shoot borer *Hypsipyla grandella* which has completely ruined some of the plantations. Cedar in mixture with Majagua appears to be a good combination. Plantains are sometimes grown as an overstorey for Cedar, but, because of their low height, this results in the production of short trunks having little timber.

23.3 (81) : 12.26–8 : 21.0. Navarro de Andrade, E. **An alien in Brazil.** *Amer. Forests* 47, 1941 (323–6, 336, 351–2).

The author reports on his experimental and plantation work with Eucalypts since 1903, which he has carried out as an officer of the Paulista Railroad Company of Sao Paulo. In spite of considerable local opposition to the large-scale introduction of an exotic tree, his studies and work led to the planting of about 100 million Eucalypts in the State of Sao Paulo and almost as many more throughout the rest of Brazil. The experimental plantings of the Paulista Company at present contain 123 *Eucalyptus* species the seed of which was procured chiefly from Australia, Algeria, and South Africa. The author's experiments included seed-origin trials, which showed *inter alia* that *E. goniocalyx* always developed poorly when obtained from Australian seed but on the contrary always gave excellent results when the seed was brought from California. In the Paulista plantations Eucalypts are grown on short rotations—often only 20 years—and are selectively cut every seven years or so. According to the author's measurements, the Eucalypts enrich the soil with some 12,500 lb. of litter per acre per annum. Since 1927 the forest service of the Paulista Company has supplied the company's locomotives with 2 million cu. m. of Eucalypt fuelwood. A total length of 1·1 million m. of poles for telephone, telegraph, and electric service and of piles for foundations has been furnished to date to the Paulista and other railroad companies, together with large quantities of fencing material. The timber has so far proved entirely satisfactory for all these uses. Following tests on the author's behalf at the U.S. Forest Products Laboratory, Madison, Wisconsin, a paper mill in Sao Paulo has been working with pulp from Eucalypts since 1927. Writing and printing papers are made using 25 to 30 per cent. of bleached pulp from Eucalypts, and in some papers the content of Eucalypt cellulose is as high as 60 per cent.

23.3 : 11.6 (54.5) : 23.24. **Afforestation of water-logged areas in the Punjab.** *Indian For.* 67, 1941 (263–4).

The planting technique used for the plantation described by Chopra [*For. Abs.* 2 (214)] is criticized on the grounds that (i) June–August planting gives results much inferior to those of April planting; (ii) 6-in. plants are too small for good establishment; (iii) shallow and frequent hand watering does not encourage the root systems to reach the subsoil water and causes crusting of and deposition of salts on the surface soil. Costs should be appreciably less if an improved technique were used.

23.3 : 11.49.2 : 23.21 : 12.19.3 (43.9). Roth, G. A magyar szíkesek erdösítéséröl. **[On the afforestation of the Hungarian szik soils.]** *Erdész. Kisérl.* 42, 1940 (225–52). [Hu.g.]

Lecture delivered at the fourth session of the Centre International de Sylviculture in Hungary in 1940. The properties of the szik soils are discussed. For successful afforestation the soil must be thoroughly loosened to increase its permeability to water. As a standard practice, planting is preceded by several years of agricultural cropping and is followed by cultivation between the rows as long as this is practicable. The choice of tree species is facilitated by soil indicators. On the more difficult sites *Tamarix tetrandra* Pall., *T. odessana* Stev., and *Elaeagnus*

angustifolia L. are the principal trees employed owing to the ability of their roots to pierce the very compact top soil.

23.3 : 21.64 (76.4). GORDER, C. G. VAN. **Tree survival in a high plains area.** *Soil Conservation* 6, 1940–41 (180–2). [Soil Conservation Service.]

Report on experimental planting in the dry south-east portion of Dallam County, Texas. Run-off water was utilized by planting in low places and on specially engineered sites to which water was diverted from adjoining roads and fields. Survival counts for the past 5 years show satisfactory results for the 9 principal species tested. Of these, *Gleditsia triacanthos*, *Toxylon pomiferum*, and *Chilopsis linearis* gave survivals of over 80 per cent. Cottonwood (*Populus* sp.), which showed a survival of 67 per cent., gave the fastest height and diameter growth.

23.3 : 23.21 (75 : 76). MINCKLER, L. S. **A preliminary guide for the reforestation of old fields in the Great Appalachian Valley and adjacent mountain regions.** *Tech. Note Appal. For. Exp. Sta.* No. 45, 1941. pp. 6.

Based on third-year survival and growth results from 700 experimental plantations on areas representing all major old-field site conditions, a planting chart has been prepared which shows the species and mixtures recommended for different conditions of aspect, soil depth, topographic position and desirable soil condition. Mixtures, particularly by square groups, are preferred to pure plantings. Care should be taken to avoid rodent damage to hardwoods. Oak and Red Gum are particularly susceptible to attack and should not be planted in rodent-infested areas.

23.3 : 23.21 : 23.22 (75 : 76). MINCKLER, L. S. **Preliminary results of experiments in reforestation of cutover and burned Spruce lands in the southern Appalachians.** *Tech. Note Appal. For. Exp. Sta.* No. 47, 1941. pp. 5.

Following clear cutting and burning in the Spruce type of this region extensive areas have been overgrown with a dense cover of vegetation that greatly hinders the establishment of plantations. Preliminary results from experiments with Red Spruce and Red Pine on difficult sites indicate that first-year survival of artificial regeneration was improved by (*a*) release of plants from competing vegetation during early July of first season, (*b*) direct sowing on prepared spots 2½–3 ft. in diameter with seed mulched and screened, and (*c*) broadcast burning before planting. [Cf. *For. Abs.* 2 (209).]

23.3 : 23.21 : 11.62.11 : 11.42. **What's new in farm science. Part 2: Annual report of the Director, Agricultural Experiment Station, University of Wisconsin, Madison.** *Bull. Wis. agric. Exp. Sta.* No. 449, 1940. pp. 96.

Only 'pioneer' species such as Black Locust, Box Elder, Red Cedar and Cottonwood can be used with success in the reforestation of areas where the topsoil is removed or buried by erosion. Cottonwood was found to thrive on exposed marl beds with high lime content and soils growing Black Locust showed a considerable increase in nitrogen content (p. 16).

23.3 : 23.21 : 12.25 : 21.64. STATE OF NEW YORK. **Conservation Department. Thirtieth annual report, for the year 1940.** *State of New York Legislative Document* (1941) No. 38. pp. 402.

Practically all Balsam Fir (*Abies balsamea*) in field plantations have failed to survive (p. 72).

23.3 : 23.22.1 : 11.47.1 : 12.26–8. LANDON, F. H. **A planting experiment on waste land.** *Malay. For.* 10, 1941 (69–71).

A planting experiment with Keladan (*Dryobalanops oblongifolia*) on waste land suggests, though not conclusively, that an initial burn is advantageous, while manuring has no beneficial effect. Planting in cultivated patches is significantly more successful than planting in small holes. *Author's summary.*

23.4. *Formation of Forest by Natural Succession*

23.4 : 12.26–8 : 22.89 : 12.25. STATE OF NEW YORK. **Conservation Department. Thirtieth annual report for the year 1940.** *State of New York Legislative Document* (1941) No. 38. pp. 402.

From observation it appears that the presence of coniferous plantations on otherwise open lands tends to accelerate the establishment of natural hardwood reproduction that comes in between the planted softwoods (pp. 68–9).

23.6. *Care of Regeneration in the Initial Stage of Establishment*

23.6 : 23.24 : 12.26–8 : 41. CUMMINGS, W. H. **Effect of screen protection on first-season growth of Yellow Poplar planted in an old field.** *Tech. Note cent. St. For. Exp. Sta.* No. 28, 1941. pp. 2.

Tests were made with four types of open-top screen made of 12-mesh black enamelled screening, including 1-ft. and 1½-ft. cylinders 5·6 in. in diameter and 1-ft. and 1½-ft. cone frustums 3·7 in. in diameter at ground and 7·5 in. across the top. Nine seedlings, selected at random, were used under each type of screen and in an unscreened check. At the end of the first growing season all seedlings survived and average height increment varied from the highest of 0·49 ft. under the 1½ ft. cylinder down to 0·14 ft. for the control.

24. TENDING OF STANDS AND TREES

24.1. *Cleanings*

24.1 : 22.83 : 12.25 : 12.26–8. MULLOY, G. A. **Cleaning of scattered young Balsam Fir and Spruce in cut-over hardwood stands.** Lake Edward, Champlain County, P. Q.—Project No. 7. *Silvic. Res. Note Dom. For. Serv.* No. 67, 1941. pp. 19.

Scattered coniferous advance growth under stands of practically pure hardwoods, mainly Beech and Hard Maple, is liable to intense suppression from hardwood sprout and seedling growth following the clear cutting of the main hardwood stand for fuelwood. It is shown that the release of pre-established Spruce and Balsam Fir by cleaning out 7-year-old hardwood regrowth resulted in an increased height growth of the conifers and this effect lasted for at least 16 years. Whether the hardwoods were cut at breast height or at the ground did not appear to affect this result. Spruce benefited more than Balsam Fir by the cleaning, which appears to be of little value for the latter species when over 7 ft. high as it can then compete on favourable terms with the hardwoods. The cleaning had no effect on the number of hardwoods per acre 16 years after the operation.

24.2. *Thinnings*

24.21 : 12.25 : 24.25. UNITED STATES. **Twentieth annual report of the Southern Forest Experiment Station, January 1, 1940–December 31, 1940.** New Orleans, La. [1941.] pp. 39.

Data from thinning plots in a 44-year-old Loblolly and Shortleaf Pine stand indicate that best results are obtained by removing the rough dominant trees, leaving the reserved trees spaced at approximately 15 ft. The net growth in a plot thus treated was more than 3 times that of the unthinned plot (p. 15).

24.25 : 12.11.12. PUSTER. Pflanzenseele und Wurzelstock im Dienste der Forstwirtschaft. **[The root systems of stumps as an aid to forestry.]** *Forstwiss. Cbl.* 62, 1940 (198–204). [G.] Biol. Abs. 15 (13450).

Increased growth in a stand during the first two years after thinning cannot be due to increased root and leaf surface, as these cannot increase significantly before the second year. The root systems of the felled trees remain active for at least the first season after cutting and dissolve out plant foods from the soil, thus making extra supplies available for the roots of standing trees. This is one reason why selective cutting is better than clear cutting.

24.25 : 21.63 : 57.0 : 12.25. ZIMMERLE, H. Über die Veränderungen der Baumklassen bei der Fichte. **[On changes in tree classes in Spruce.]** *Allg. Forst- u. Jagdztg.* 116, 1940 (114–25). [G.] Biol. Abs. 15 (11293).

A study was made of the changes between 1907 and 1938 in the number and percentage of trees of different crown classes in Spruce stands subjected to 5 grades of thinning. All thinnings, and especially those concentrated on the smaller trees, gave a progressive increase in the percentage of dominants. Dominants in 32-year-old stands in 1907 made up 23·6–35·8 per cent. of the total number of trees; in the same stands at 63 years of age in 1938, dominants had increased to 53·8–71·6 per cent.

24.3. *Opening of the Canopy. Release and Improvement Fellings*

24.3 : 12.19.2 (76.2). PUTNAM, J. A., and BULL, H. **Improvement cuttings in the bottomland hardwood forests of Mississippi.** *Occ. Pap. Sth. For. Exp. Sta.* No. 93, 1940. pp. 14.

The forests of the Yazoo-Mississippi Delta, which cover about 1¾ million acres, include a large proportion of inferior species that should be reduced in order that the forests may be used most efficiently. This paper presents recommendations for improvement cuttings to be applied with this end in view. The decision to remove any particular tree is based on five considerations or tests including the species, size, form and quality, vigour and thrift, and position and space occupied by the tree in question. These are each discussed briefly and specific cutting rules are outlined in four groups relating to the degree of cutting proposed. The products that may be obtained

from improvement cuttings are also discussed, and for the region in question these include fuelwood, posts, pulpwood, chemical wood, stave, small-dimension and speciality stock, and two classes of saw timber.

24.31 : 07.7. PESSIN, L. J., and SHEPARD, A. L. **A tool to make holes for poison injection.** *Sth. For. Notes* No. 38, 1941 (1).

A special attachment made from octagon tool steel is fixed to the axe head and by a single stroke will remove a core of wood from the tree 1 in. long and ½ in. in diameter, leaving a clean hole.

24.31 : 12.26–8. UNITED STATES. **Twentieth annual report of the Southern Forest Experiment Station, January 1, 1940–December 31, 1940.** New Orleans, La. [1941.] pp. 39.

Scrub Oaks can be killed and sprouting stopped or greatly reduced by pouring a strong solution of sodium arsenite into holes ½ in. in diameter and 1 in. deep, in the stem or large roots just below ground surface (p. 14).

24.4. *Shelterbelts. Windbreaks*

24.4. BYALLOVICH, Yu. P. **Planning the location of shelterbelts.** *Sovetskaya Agronomiya* 1940 (1), (77–84). [R.] H.S.B.

Shelterbelts must be spaced so that, while preserving their utility, they do not interfere with mechanical cultivation. It is shown that under Ukrainian conditions gaps can be arranged in windbreaks—especially at points where two shelterbelts cross—so as not to impair to an appreciable degree the efficacy of the protective system and yet allow for the passage of large agricultural machinery.

24.4 : 11.14.4 : 11.41.3. STOECKELER, J. H., and DORTIGNAC, E. J. **Snowdrifts as a factor in growth and longevity of shelterbelts in the Great Plains.** *Ecology* 22, 1941 (117–24). [Lake States Forest Exp. Sta.]

Shelterbelts with one or more dense-growing shrub rows at least 8 ft. high were very effective in trapping snow in drifts 5–8 ft. deep or more. The snow was practically all stopped in a zone 30–80 ft. wide, on the lee side of the first shrub row encountered by the wind. Narrow belts of tall trees devoid of limbs near the ground allowed the snow to sweep under and settle in a thin sheet averaging 1–2 ft. in depth on the lee side of the belt in a zone extending 600–1,200 ft. beyond it. Where shelterbelts were of such design as to cause deep drifts in the belt, the increase of soil moisture from fall to spring was equivalent to 10 in. of water, while the crop areas within 80 ft. of the belt showed an increase of 5 in. of water due largely to lateral movement from melting snowdrifts. The great increase of soil moisture from melting snow is suggested as partly explaining why shelterbelts in the northern plains often maintain themselves in vigorous growing condition for as long as 50 years while in the southern plains, in a zone of apparently equal effective precipitation, the tree belts on fine-textured soils may survive for only 20 or 30 years. Where snow cover was fairly deep (over 3 ft.), frost depth in tree belts was as little as 0–4 in., while in nearby fields having less than 1 ft. of snow cover, frost depth was 12–18 in. on 1st March. In midwinter frost depth in open fields was found to be at least 2–3 ft. *From authors' summary.*

24.5. *Pruning*

24.51 : 07.7. ZACH, L. W. **A reply to James D. Curtis on his 'Comments on the Hebo pruning club'.** *J. For.* 39, 1941 (486–8). [Oregon State College.]

It is maintained that the Hebo pruning club is particularly suitable for pruning the lower dead branches from young Douglas Fir trees, which are vigorous and heal rapidly. Healing in young Douglas Fir timber following the use of this tool is shown to be superior to that after saw pruning. [Cf. *For. Abs.* 2 (216, 299).]

3. FOREST UTILIZATION.

31. PROPERTIES AND ANATOMY OF WOOD

31.0. *General Information on Woods*

31.0 (410). **Varieties and qualities [of British home-grown timbers].** *Wood* 6, 1941 (183–9).

FOREST TECHNOLOGY.

List of the principal British forest trees with short notes on the timber properties of each.

31.0 : 12.26–8 : 31.2 (66.9). MACKAY, J. H. **Tropical substitutes for softwoods?** *Niger. For.* 1 (2), 1940 (41–2).

The Nigerian species *Alstonia congensis*, *Antiaris africana*, *Daniellia ogea*, *Lannea acidissima*, *Cleistopholis patens*, *Ricinodendron*

africanum, Ceiba pentandra and *Bombax buonopozense* are all perishable and after logging should be quickly converted and kiln dried. Protective measures against borers and fungi are noted for these species and for *Triplochiton scleroxylon*, which is a superior timber and more durable. All of these timbers with the exception of *Lannea acidissima* are markedly inferior to Canadian Spruce in stiffness. Air-dry weights and values for maximum fibre stress and modulus of elasticity are given for each species in comparison with Spruce as follows, the latter species being rated at unity.

	Air-dry weight	*Maximum fibre stress*	*Modulus of elasticity*
Canadian Spruce	28	1·00	1·00
Triplochiton scleroxylon	25	1·12	0·76
Lannea acidissima	27	1·09	1·11
Antiaris africana	27	1·08	0·81
Cleistopholis patens	22	0·96	0·75
Alstonia congensis	24	0·90	0·71
Bombax buonopozense	23	0·81	0·76
Ceiba pentandra	21	0·80	0·74
Ricinodendron africanum	18	0·74	0·61
Daniellia ogea	20	0·70	0·51

31.0 : 12.26–8. BETTS, H. S. **American woods: Maple.** U.S. Forest Service, Washington, D.C. 1940. pp. 12 + gph. & maps.

Thirteen species of Maple grow in the United States. Six of these are of commercial importance and by far the most important and abundant is Sugar Maple (*Acer saccharum*). This pamphlet presents briefly data on nomenclature, distribution and growth, supply, production by uses, wood properties, principal uses, and quantities of manufactured products for the commercially important species.

31.0 : 12.26–8. **The properties of Australian timbers: Sassafras (*Doryphora sassafras* and *Daphnandra micrantha*).** *Mon. News Lett. Div. For. Prod. Aust.* No. 111, 1941 (3).

31.0 : 12.26–8. **The properties of Australian timbers: White Stringybark (*Eucalyptus eugenioides* Sieb. and *E. globoidea* Blakely).** *Mon. News Lett. Div. For. Prod. Aust.* No. 112, 1941 (3).

31.0 : 12.26–8 : 33 : 09.4 : 31.1 : 31.2 : 31.41 : 33.36.1 : 33.36.3. HOYLE, R. J., HENDERSON, H. L., BLEW, J. O., and BROWN, N. C. **Beech: its production, properties, uses, seasoning and treatment.** *Bull. N. Y. St. Coll. For.* 13 (3) [*Tech. Publ.* No. 51], 1940. pp. 76.

This bulletin is in three parts: the first deals mainly with the products of Beech (*Fagus grandifolia*), the structure, properties and characteristics of the wood and its uses in industry and construction; the second part is concerned with problems connected with the air seasoning and kiln drying of the wood; and the third part deals with various aspects of the preservative treatment of Beech.

31.0 : 12.26–8. **The properties of Australian timbers: Silver Silkwood (*Flindersia acuminata*).** *Mon. News Lett. Div. For. Prod. Aust.* No. 102, 1940 (3).

31.0 : 12.26–8. BRUSH, W. D. **Foreign woods: Greenheart (*Ocotea* (*Nectandra*) *rodioei* (Schowl) Mex.).** Forest Service, U.S. Department of Agriculture, Washington, D.C. 1941. pp. 9 + map. P.R.

Greenheart occurs in several parts of northern South America, but practically all of the present commercial supply is derived from British Guiana, which exported 429,815 cu. ft. of the timber in 1938. The chief commercial tract of Greenheart in British Guiana is estimated to contain 277,000,000 cu. ft. of timber; many of the stands are relatively inaccessible and there is little danger of exhausting the supply. Greenheart has a uniform fine texture, is extremely heavy, hard, stiff, and strong. The heartwood is highly resistant to marine borers, and consequently the most important use of the timber is for structures exposed to sea-water, though it is also valuable for all purposes requiring strength and resistance to abrasion and is a popular wood for fishing rods. Notes are included on common names, logging methods, and other timbers that have passed under the name Greenheart.

31.0 : 12.26–8. BETTS, H. S. **American woods: Tupelo.** U.S. Forest Service, Washington, D.C. 1940. pp. 11 + gph. & maps.

The four species *Nyssa aquatica, N. sylvatica, N. biflora* and *N. ogeche* are included under the name Tupelo. The first two species are the largest, most abundant and most important, and all but *N. sylvatica* are water-loving trees growing in swamps and near streams in the south-eastern United States. This pamphlet presents briefly data on nomenclature, distribution and growth, supply, production by uses,

wood properties, principal uses, and quantities of manufactured products.

31.0 : 12.26–8. **The properties of Australian timbers: White Birch (*Schizomeria ovata* D. Don).** *Mon. News Lett. Div. For. Prod. Aust.* No. 113, 1941 (3).

31.0 : 12.26–8. BRUSH, W. D. **Foreign woods: Mahogany (*Swietenia* species).** Forest Service, U.S. Department of Agriculture, Washington, D.C. 1941. pp. 22 + maps. P.R.

A re-issue of the publication noted in *For. Abs.* 1 (172).

31.1. *Structure. Anatomy. Identification*

31.1. HYLAND, F. **Preventing the curling of wood sections.** *Trop. Woods* No. 64, 1940 (41–3).

The method described consists essentially in sandwiching the wood sections between wire screens during preparation for mounting. Stainless steel cloth with a 35 × 35 mesh and a wire diameter of 0·009 in. proved ideal, but satisfactory results can be obtained with stainless steel or monel metal, mesh 40 × 40 and wire diameter 0·0095 or 0·01 in., or aluminium, mesh 40 × 40 and wire diameter 0·01 in. Sections are cut and transferred with a brush to a wire screen previously placed in a suitable receptacle with enough 50 per cent. alcohol to fill the meshes. The surface tension of the liquid prevents curling and drying out. When the screen is filled, the second screen is superimposed and the two are bound together with coarse white cotton. The sections are thus held flat during the subsequent processes of staining and dehydration. After 10 minutes in the final xylol they should be hard enough for the screens to be removed and may then be mounted or left indefinitely without curling.

31.1 : 07.7 : 56.02. STORK, H. E. **Sections for microscopic study from increment borings.** *Trop. Woods* No. 64, 1940 (40–1).

The increment borer is recommended to collectors as a means of securing wood samples to accompany herbarium specimens. Samples can be cut in a few minutes and stored at once in 6-inch screw-cap vials of 70 per cent. alcohol. Labels written in graphite pencil can be enclosed with the sample in the alcohol. The author has successfully used a 14-inch borer cutting a $\frac{1}{8}$-inch core, which gives samples large enough for microscopic examination. Soft woods with much thin-walled parenchyma may suffer some distortion, but this is not serious and can be allowed for when sections are being studied under the microscope.

31.1 : 12.14.2. BARGHOORN, E. S. **The origin of ray initials in the cambium.** *Abstr.* in *Amer. J. Bot.* 27, 10, 1940 (2s). [Harvard University, Cambridge, Mass.] O.B.D.

Ray initials in conifers and dicotyledonous trees and shrubs originate by anticlinal cell divisions in the fusiform cambial initials. The frequency of ray origins in the cambium varies in different individuals and in different stages of ontogeny.

31.1 : 12.14.2 : 12.14.4. FREY-WYSSLING, A. Zur Ontogenie des Xylems in Stengeln mit sekundärem Dickenwachstum. [**On the ontogeny of the xylem in stems with secondary thickening.**] *Ber. dtsch. bot. Ges.* 58, 1940 (166–81). [G.] Biol. Abs. 15 (13222).

31.1 : 12.25 : 12.14.3. BANNAN, M. W. **Variability in wood structure in roots of native Ontario conifers.** *Bull. Torrey bot. Cl.* 68, 1941 (173–94). [University of Toronto.] O.B.D.

A study was made of the secondary xylem in roots of native species of *Thuja*, *Tsuga*, *Abies*, *Larix*, *Picea*, and *Pinus* to determine the range of structural variation within the species. Fine-textured, stem-like wood was found in the roots of small trees, in the upper side of buttress roots of mature trees, about the periphery of the largest lateral roots, in roots exposed by erosion, and in vertical roots deep in the soil. Open wood with large early-wood tracheids and little late wood was observed in the first 1 or 2 centimeters of growth in the distal parts of lateral roots located in the top few inches of soil. Tracheid diameter varied greatly in different parts of the root system, the widest range being noted in *Larix* and the least in *Thuja*. No consistent relationship was discovered between tracheid size and soil moisture. Pitting in the radial walls of tracheids varied from opposite to alternate, the latter occurring most frequently in the inner wood of lateral roots of *Tsuga*, *Larix*, and *Picea*. Alternate pits were less abundant in *Thuja* and *Pinus*. The distribution of resin ducts was exceedingly variable. Ducts were most numerous in injured and fewest in apparently unharmed material, for instance, certain roots penetrating deep into

uniform sand. Ray height and distribution varied greatly, both in different parts of the root systems and in different conifers. In general, rays were highest and least numerous in the distal parts of lateral roots, and lowest in vertical roots. The range of variation within the root system of a single tree was greatest in certain Abietineae, least in *Thuja*. The proportions of the various kinds of ray cells varied throughout the root system and from one genus to another, the greatest variation being observed in *Picea* and the least in *Thuja*. Because of this variability in wood structure it is clear that anatomical studies must be based upon wide selections of material if they are to have taxonomic value. *From author's summary.*

31.1 : 12.26–8. BAILEY, I. W., and HOWARD, R. A. **The comparative morphology of the Icacinaceae. II. Vessels.** *J. Arnold Arbor.* 22, 1941 (171–87). [Harvard University.]

The vessels of the different genera of Icacinaceae were found to exhibit irreversible trends of structural specialization parallel with those occurring in other families of dicotyledons. On the basis of vessel structure the family may be divided into three main groups: (i) having vessels with exclusively scalariform perforations; (ii) having vessels in the secondary xylem with scalariform-porous perforations; (iii) having vessels in the secondary xylem with exclusively porous perforations. In general, vessel length tends to decrease and vessel width to increase in the same progression. The first and second groups contain genera of the Icacineae with trilacunar nodes, while the third group comprises the unilacunar Icacineae and the remaining tribes—Iodeae, Sarcostigmateae, and Phytocreneae—with unilacunar nodes. [Cf. *For. Abs.* 3 (30).]

31.1 : 12.26–8 (7 : 8). RECORD, S. J. **American timbers of the Mahogany family.** *Trop. Woods* No. 66, 1941 (7–33).

The woods of the American genera of Meliaceae are described, with brief notes on uses, common names and distribution.

31.1 : 12.26–8 (7 : 8). RECORD, S. J., and HESS, R. W. **American woods of the family Rutaceae.** *Trop. Woods* No. 64, 1940 (1–28).

Descriptions of the woods of the various genera, with brief notes on uses, common names, and distribution.

31.1 : 31.3. KLINGSTEDT, F. W. [**Structure and reactions of wood.**] *Papp. Trävaru-Tidskr. Finl.* 22, 1940 (407–14). *Abstr.* in *Auszüge aus der Literatur*—suppl. to *Papierfabrikant* 39, 1941 (63–4). P.R.

A discussion of cell-wall structure and composition in relation to chemical reactions.

31.2. *Physical Properties*

31.22. Relation to Water, Air, Gases

31.22 : 31.1. STAMM, A. J., and MILLETT, M. A. **The internal surface of cellulosic materials.** *J. phys. Chem.* 45, 1941 (43–54). [Forest Products Laboratory, Madison, Wis.] O.R.S.

Values for the internal surface of cellulosic materials have been calculated from adsorption data for gases and vapors, from data on selective adsorption from solution, from data on heats of swelling and on adhesion tension taken from the literature, and also from new data on selective adsorption. These values, as well as other values taken from the literature, fall into two groups. Systems in which the cell wall is not swollen give surfaces of about 2×10^3 cm.^{2} per gram, whereas systems in which the cell walls are swollen give surfaces of about 3×10^6 cm.^{2} per gram. The former are shown to measure only the microscopically visible surface, whereas the latter measure the surface of the transient capillary structure created within the cell walls by the swelling agents. *Authors' summary.*

31.22.1 : 07.7. GRAF, O. Über die Bestimmung des Wassergehalts der Hölzer : Vergleichsversuche mit verschiedenen Holzfeuchtigkeitsmessern. [**On the determination of the moisture content of timbers: comparative experiments with different moisture meters.**] *Mitteilungen des Fachausschusses für Holzfragen beim Verein deutscher Ingenieure und Deutschen Forstverein* No. 25, 1940 (1–17). [G.] P.R.

As a result of several tests in which moisture was determined by drying specimens taken with a saw or a borer, and by means of a hair hygrometer, a calorimetric moisture meter, and two resistance-type electrical moisture meters, a number of recommendations are made regarding the testing technique to be adopted with each of these methods.

31.22.1 : 07.7 : 33.36.3. NOWAK, A. Entwicklung der Messgeräte zur Feststellung der

Holzfeuchtigkeit. Derzeitiger Stand, notwendige Ergänzungen, voraussichtliche Entwicklung. **[Development of measuring instruments for the determination of moisture in wood. Present position, necessary additions, and probable development.]** *Mitteilungen des Fachausschusses für Holzfragen beim Verein deutscher Ingenieure und Deutschen Forstverein* No. 28, 1940 (11–9). [G.] P.R.

The range of moisture over which resistance-type electrical moisture meters work does not extend above the fibre saturation point. Within a moisture range of 6 to 20 per cent., the error of measurement does not exceed $\pm 1\frac{1}{2}$ per cent. provided the moisture is fairly evenly distributed. If it is not, useful results can still be obtained with opposite-needle electrodes penetrating to one-tenth of the width of the wood. The use of resistance-type electrical moisture meters is limited by their high cost. Dietrich's method, which is being developed at the 'Forschungslaboratorium Bäseler des Reichsbahnzentralamtes München', is based on the measurement of the length of time required to attain a given rise in the temperature of wood, using a constant electrical source of heat, the heating time being the longer the higher the moisture content. It is claimed that even with a moisture content exceeding 150 per cent. the error of measurement remains within ± 5 per cent. The method is thought to be promising, especially since the required apparatus is fairly cheap.

31.22.2 : 31.1. Frey-Wyssling, A. **The cause of anisotropic shrinkage of wood.** *Holz* 3, 1940 (349–53). [G.] Chem. Abs. 35 (2692). P.R.

The anisotropic swelling of wood is due to the variable number of cell walls that are encountered in different directions. The shrinkage of the intermediate layer is the prime cause of anisotropic swelling; the fine structure and the thickness of the secondary cell walls are relatively unimportant in this connexion.

31.24. Calorific Value

31.24. Tiemann, H. D. **The fuel value of wood.** *Sth. Lumberm.* 162 (2043), 1941 (39–41).

While definite data are lacking on the amount of heat per pound of dry wood substance for different kinds of wood, the figure of 8,500 B.t.u. is considered to represent the total calorimeter value for woods in general that do not contain much rosin or gums. It is pointed out that the method of measuring heat is very important and that the useful heat from burning fuel is a different quantity to the total calorimeter value. Weights and fuel values per cord are tabulated for a number of species at 20 per cent. moisture content and the equivalent fuel value in tons of hard coal per cord is given for each species.

31.24 : 31.23 : 11.48 : 33.06 (43.9). Fehér, D. Összehasonlító regionális vizsgálatok a magyar fa fütöhatásáról. **[Investigations on the calorific value of Hungarian fuelwoods.]** *Erdész. Kisérl.* 42, 1940 (171–202). [Hu.g.]

Data on the specific weight and heat value of fuelwoods from the principal forest regions of Hungary.

31.27. Mechanical Strength

31.27 : 11.11.2. Graf, O., and Egner, K. Versuche über die Festigkeitseigenschaften verschiedener Hölzer in gefrorenem Zustand und besonders nach wiederholtem Gefrieren und Auftauen. **[Experiments on the strength properties of different woods in the frozen state and especially after repeated freezing and thawing.]** *Mitteilungen des Fachausschusses für Holzfragen beim Verein deutscher Ingenieure und Deutschen Forstverein* No. 25, 1940 (18–30). [G.] P.R.

The bending strength, compressive strength, and resistance to impact of Pine, Spruce, and Ash samples was not impaired by a ten-times-repeated freezing, in a water-saturated condition, at $-15°$ C. The resistance to impact of the frozen samples was not below normal.

31.27 : 12.25 : 31.23. Australia. **Fourteenth annual report of the Council for Scientific and Industrial Research for year 1939–40.** Govt. Printer, Canberra. 1940. pp. 102.

Hoop Pine (*Araucaria cunninghamii*) has been shown to have much the same strength/weight ratio as Spruce and to be suitable for use in aircraft construction (p. 51).

31.27 : 12.26–8 (91.4). Cortes, R. T. **Impact bending properties of twelve Philippine Dipterocarps.** *Philipp. J. For.* 3, 1940 (325–45). [Bureau of Forestry, Philippines.]

The timbers tested were Apitong (*Dipterocarpus* sp.), Bagtikan (*Parashorea plicata*),

Guijo (*Shorea guiso*), Mayapis (*Shorea squamata*), Manggachapui (*Hopea acuminata*), Narek (*Balanocarpus cagayanensis*), Narig (*Vatica* sp.), Palosapis (*Anisoptera thurifera*), Red Lauan (*Shorea negrosensis*), Tañgile (*Shorea polysperma*), Tiaong (*Shorea* sp.), and Yakal (*Hopea* sp.). Yakal, Narek, Guijo, and Manggachapui showed high fibre stress at the elastic limit. Guijo, Tiaong, Yakal and Palosapis had the highest modulus of elasticity. Narek, Narig, Guijo, Manggachapui, and Yakal ranked highest in modulus of resilience. Guijo, Manggachapui, Narek and Yakal ranked highest in impact bending.

31.3. *Chemical Properties*

31.3 : 12.26–8 : 33.32. STORCH, K., and MÜLLER, O. Über die Variationsbreite in der chemischen Zusammensetzung des Rotbuchenholzes. **[On the range of variation in the chemical composition of Beech wood.]** *Cellulosechemie* 19, 1941 (24–33). [G.g.] P.R.

Discrepancies in literature data on the chemical composition of Beech wood are ascribed to intrinsic variations between samples as well as to differences in analytical technique. The stem-wood samples analysed by the writers varied considerably in solubility (in NaOH) and in their content of cellulose and non-cellulose substances.

31.3 : 12.26–8 : 33.39. DAHLÉN, A. Lindträets fetthalt. **[The fat content of Lime wood.]** *Iva, Stockholm* 1940 (2), (73–8). [Sw.] L.S.

Preliminary experiments showed that extraction of Lime (*Tilia cordata*) wood meal, first with water and then with acetone, gave a yield of 5·45–8·60 per cent. of acetone extractives. Various other solvents were tried without previous water extraction and it was concluded that ether was the most suitable for this method. The ether extract was a yellow-red oil, rather fluid at normal temperatures, from which some crystallization took place on standing for a time in a cool room. Its saponification number was determined as 210. The unsaponifiable constituents were determined by the usual method of forming a digitonide; treatment of the latter with acetic anhydride gave a compound which had a melting point of 123° C. after several recrystallizations from alcohol and which is believed to be phytosterin acetate. In view of these results, further experiments were made on a rather wider basis. The percentage of ether extract obtained from wood taken from different trees and different parts of trees at different times of year ranged from 4·60 to 13·38, the most frequent values lying at about 6–8 per cent. No clear correlation could be found between the percentage yield of ether extract and either age of tree, part of tree, or time of year. The last result is remarkable in view of previous positive statements in literature on the influence of season upon the fat content of trees. To obtain a larger quantity of extract 8 kg. of wood meal from one log section were extracted with ether for 8 hours and the filtered extract was dried *in vacuo* for several days at 50° C. At the end of the period an absolutely constant weight had not been attained, but drying was discontinued for fear of losing the volatile constituents of the extract. The yield obtained was about 525 g. of a golden-yellow, pleasant-smelling oil that showed fluorescence. On standing in a cool room for some time crystals were formed which redissolved when the temperature was restored to normal. The specific gravity of the oil was 0·9757, its water content was practically negligible, and in 10-per-cent. solution in carbon tetrachloride it showed practically no optical activity. Analysis gave 71·63 per cent. carbon, 10·79 per cent. hydrogen, and 17·58 per cent. oxygen, calculated on the ash-free material. The ash content was 0·09 per cent., the acid number 64·6, and the saponification number 237. Determination of the iodine number by the Hübl–Waller method gave 64·6. The Hehner, Reichert–Meissl, and Polenske numbers were respectively 84–85, 5·4, and 2·6. On determining the unsaponifiable substances in about 49 g. of oil, about 0·3 g. of phytosterin acetate, with a melting point of 126° C., were obtained after several recrystallizations. Some of the oil was re-esterified with methyl alcohol and the methyl esters were subjected to fractional distillation, during which about 75 per cent. was distillable in fractions whose boiling points showed clearly that methyl esters of fatty acids were involved. The distillate was composed chiefly of the esters of palmitic and unsaturated acids, but some esters of lower fatty acids were also present. Further analysis is to be made of the various fractions. The results demonstrate that the ether extract of Lime wood is composed chiefly of fat.

31.4. *Durability. Decomposition*

31.41. Natural Durability

31.41 : 12.26–8. SARAWAK. **Annual report on the Forest Department for the year 1940.** Govt. Printer, Kuching. 1941. pp. 13.

While 43 per cent. of the timber originally placed in a 'graveyard' for testing purposes had disappeared at the end of 5 years as a result of termite and fungal attack, Belian (*Eusideroxylon zwageri*) showed practically no damage (p. 8).

31.42. Attack by Plant Organisms

31.42.11 : 12.21 : 12.25. CANADA. **Report of the Lands, Parks and Forests Branch for the fiscal year ended March 31, 1940.** *Repr.* from the Annual Report of the Department of Mines and Resources, pp. 60–135. King's Printer, Ottawa, 1941.

Trametes serialis has been identified as a cause of purple discoloration in Douglas Fir and has been isolated from Douglas Fir building material and a Jack Pine sleeper (p. 130).

31.42.11 : 12.25 : 31.23 : 31.27. SCHEFFER, T. C., WILSON, T. R. C., LUXFORD, R. F., and HARTLEY, C. **The effect of certain heart rot fungi on the specific gravity and strength of Sitka Spruce and Douglas Fir.** *Tech. Bull. U.S. Dep. Agric.* No. 779, 1941. pp. 24. [Bureau of Plant Industry, U.S.D.A.]

The fungi used in these tests were *Polyporus schweinitzii*, *Fomes pini* and *F. laricis*. Little correlation could be found between the appearance of wood attacked by *P. schweinitzii* and the degree of decay or reduction in toughness up to the final point when the infected wood breaks up into cubical masses. On the other hand the white pockets characteristic of decay caused by *F. pini* are a guide to the progress of decay and strength reduction. Although *F. pini* and *P. schweinitzii* both cause large reductions in strength in advanced stages of their development, the latter is more effective in the early stages of decay, particularly in reducing the shock resistance of the wood, and as this is accomplished without appreciable reduction in specific gravity or change in appearance it is pointed out that some test for determining the presence of this fungus in the early stages of decay is desirable. Wood close to an area infected by either of these fungi was found to be normal in strength properties.

The tests indicated that for different mechanical properties the same fungus will cause different percentage reductions and that the relationship between the reduction of any two properties varies with the species of fungus. *From authors' summary.*

31.42.11 : 31.43 : 13.2 (729.7). BROOKS, R. L., ADAMSON, A. M., BAKER, R. E. D., and CROWDY, S. H. **Durability tests on untreated timbers in Trinidad.** *Carib. For.* 2, 1941 (101–19). [E.span.] [Imperial College of Tropical Agriculture.]

In the graveyard tests described, which lasted for three years, fungus attack was responsible for more damage than termites, although very large populations of *Heterotermes* developed throughout the graveyards during the first six months. There was a fairly close correlation between the relative susceptibilities of the various timbers to termite and fungal attack, six of the nine species with greatest resistance to termites being also resistant to fungi. The statement on the following page shows the relative resistance of the timbers to both forms of attack.

31.42.12 : 12.25 : 12.21. TAYLOR-VINJE, M. **Studies in *Ceratostomella montium*.** *Mycologia* 32, 1940 (760–75). R.A.M. 20 (238).

The results are given of a cytological study of *Ceratostomella montium*, which causes a blue stain in Lodgepole Pine (*Pinus contorta*) in Wyoming.

31.43. Attack by Animal Organisms

31.43 : 13.2. BECKER, G. Beobachtungen über Schädlichkeit, Frass und Entwicklungsdauer von *Anobium punctatum* De Geer ('Totenuhr'). **[Observations on the harmfulness, feeding, and duration of development of *A. punctatum*.]** *Z. PflKrankh.* 50, 1940 (159–72). [G.] R.A.E. A29 (233–4).

Anobium punctatum appears to attack all German timbers. Infestation is generally limited to the sapwood, and in Oak, Ash, and *Robinia* the heartwood is always avoided. In coniferous timbers the larval mines are usually in the springwood in the annual rings, but in deciduous timbers their course is much more irregular. Various cases of infestation are described with special reference to the duration of the different life stages of the beetle. The character of the timber seems to have less influence on the larval growth of this species than on that of *Hylotrupes bajulus*, but high air humidity is important, as the larvae cease developing if humidity is too low and die if

Species	*No. of specimens*	*Resistance to fungi*	*Resistance to termites*
Trichilia oblanceolata Rusby	62	Very susceptible	Fairly resistant
Clathrotropis brachypetala (Tul.) Kleinh.	69	Fairly resistant	Susceptible
Mouriria marshallii Burtt Davy	70	Very susceptible	Fairly resistant
Pentaclethra macroloba (Willd.) Kuntze	60	Resistant	Very resistant
Myristica surinamensis Rol.	77	Very susceptible	Very susceptible
Ficus sp. (Figuier)	67	Very susceptible	Very susceptible
Vitex divaricata Sw.	73	Susceptible	Fairly resistant
Vitex capitata V.	44	Fairly resistant	Fairly resistant
Calophyllum lucidum Benth.	62	Susceptible	Fairly resistant
Tapirira guianensis Aubl.	69	Susceptible	Very susceptible
Eschweilera subglandulosa (Steud.) Miers	43	Resistant	Very resistant
Rhizophora mangle L.	65	Fairly resistant	Susceptible
Cordia sulcata DC.	59	Very susceptible	Very susceptible
Sterculia caribaea R. Br.	66	Very susceptible	Very susceptible
Spondias monbin L.	75	Very susceptible	Very susceptible
Symphonia globulifera L. fil.	73	Resistant	Susceptible
Sapium aucuparium Jacq.	63	Very susceptible	Very susceptible
Terminalia obovata (R. & P.) Steud.	67	Fairly resistant	Fairly resistant
Buchenavia capitata (Vahl.) Eichl.	52	Fairly resistant	Fairly resistant
Hura crepitans L.	60	Fairly resistant	Susceptible
Laetia procera (Poepp. & Endl.) Eichl.	36	Very susceptible	Very susceptible
Byrsonima spicata Rich.	79	Susceptible	Resistant
Hieronyma caribaea Urb.	76	Susceptible	Resistant
Tectona grandis Linn. (10 yrs. old)	80	Fairly resistant	Susceptible
Hernandia sonora L.	59	Very susceptible	Very susceptible
Eugenia confusa DC.	66	Very susceptible	Susceptible
Pachira insignis Sw.	56	Very susceptible	Very susceptible
Manilkara bidentata (A.DC.) Chev.	79	Very resistant	Very resistant
Tabebuia serratifolia Nichols	62	Very resistant	Very resistant
Pinus palustris Miller	81	Very resistant	Resistant
Pseudotsuga douglasii Carr.	81	Fairly resistant	Very susceptible
Guarea trichiliodes L.	59	Resistant	Very resistant
Mora excelsa Benth.	49	Susceptible	Resistant

low humidity is maintained. In dwelling rooms humidity is often at or below the critical limit. The temperatures favourable to development are lower than for *H. bajulus*. Cellars are often favourable, while central heating in many dwelling rooms affords a check. Old timber is less attacked than wood only a few years old.

31.43 : 13.2 (94). WILSON, H. B. **The importance of wood-borer damage in Australian commercial timbers.** *Aust. Timb. J.* 7, 1941 (57–8).

Native Australian insects cause little damage to commercial timber. Of the two important introduced timber pests, *Anobium* and *Lyctus*, the former never attacks Australian Eucalypts and rarely other Australian hardwoods, confining itself to softwoods and certain European and North American hardwoods, while the latter attacks only the sapwood of Australian hardwoods. Characteristics of the three types of wood borers and properties of Australian timbers in relation to them are summarized in two tables.

31.43 : 13.2 : 33.36.1. HEIDENREICH, E. Der Hausbockkäfer, Erkennung und Bekämpfung unter Berücksichtigung anderer tierischer Holzschädlinge. [**The house longhorn beetle (*Hylotrupes bajulus*), recognition and control in relation to other timber pests.**] Verlagsgesellschaft Rudolf Muller, Eberswalde, Berlin, and Leipzig. 1939. pp. 43. P.R.

31.43 : 13.2 : 33.36.1 (91.4). VARIAN, H. F., and GALLARDO, A. C. **Notes on the susceptibility to insect attack of Philippine woods.** *Philipp. J. For.* 3, 1940 (347–79). [Bureau of Forestry, Philippines.]

This study was conducted in connexion with an inventory of the (seasoned) wood specimens in the working collection of the Bureau of Forestry. Of the total of 16,120 specimens in the collection, representing 103 families, 1,437 or 8·92 per cent. were attacked by insects. It was found that sapwood was more susceptible to insect attack than the heartwood, and that powder post beetles offered the most serious threat to seasoned sapwood, while dry-wood termites proved to be the worst enemy of

seasoned heartwood soft enough for their attack. The powder post beetles found attacking the specimens were identified as *Lyctopholis rugicollis* Walker, and the dry-wood termites were identified as *Cryptotermes cenocephalus* Light. Of parasitic insects found in the holes and tunnels, a species of *Bracon* was associated with the former, and *Solenopsis geminata* Fabr. with the latter. The paradichlorobenzene/kerosene and orthodichlorobenzene/castile soap/cedar oil solutions used in controlling the infestation were both lethal to beetles and termites. Further studies, however, are needed to determine their long-term value.

31.45. Injury by Fire

31.45 : 07.7 : 33.32. METZ, L., and SEEKAMP, H. **Apparatus for measuring the fire resistance of wood-fibre boards.** *Holz* 3, 1940 (189–94). [G.] Chem. Abs. 35 (1991). P.R.

A modification of the U.S. Forest Products Laboratory fire-tube test. Both loss in weight and temperature trend are measured.

31.45 : 31.0. NEW SOUTH WALES. **Forestry Commission (Report for the year ended 30th June, 1940).** Govt. Printer, Sydney. 1941. pp. 8.

Tests have shown that incendiary bombs, made of 8 oz. of thermite and about 1 oz. of electron metal, charred timbers such as *Eucalyptus saligna* and *Syncarpia laurifolia* to a depth of only $\frac{1}{8}$ in., and *Callitris glauca*, *Tristania conferta* and *Eucalyptus maculata* to a depth of about $\frac{1}{2}$ in. in 2–4 min. It is pointed out that $\frac{1}{8}$-in. steel is holed by such a bomb in about 2 sec.

31.8. *Defects of Timber*

31.8 : 12.25. CANADA. **Report of the Lands, Parks and Forests Branch for the fiscal year ended March 31, 1940.** *Repr.* from the Annual Report of the Department of Mines and Resources, pp. 60–135. King's Printer, Ottawa, 1941.

It has been found that Spruce and Balsam Fir timber grown under conditions that produce material of high density contained a large amount of compression wood (p. 129).

31.8 : 31.1. PILLOW, M. Y. **A new method of detecting compression wood.** *J. For.* 39, 1941 (385–7). [Forest Products Laboratory, Madison, Wis.]

When thin cross sections ($\frac{1}{8}$ to $\frac{1}{16}$ in. thick) of compression wood are held against a bright light the summerwood of the compression wood appears practically opaque whereas other types of summerwood are translucent when examined under the same conditions. Pitch-soaked wood cannot be analysed in this way.

32. HARVESTING OF WOOD. LOGGING

32 : 33 : 01.6. **List of publications on logging, manufacture, and utilization of timber, lumber, and other wood products.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*790, 1940. pp. 27. P.R.

32.1. *Marking of Trees and Coupes*

32.1 : 07.7. DENGLER, H. W. **The speedy tree marker.** *J. For.* 39, 1941 (490–1). [Soil Conservation Service.]

A 12-in. file is sharpened along one edge for 6 in. from the smaller end and is then heated and bent in the shape of a question mark with radius of about 2 in. and tail end 3 in. long, the handle of the file being sawn off. A groove is sawn in a 12-in. single-bit axe handle to take the straight end of the file, which is then rivetted and wired tightly in place. This tool is best used where the marker works in long narrow strips, blazing one side of the tree only. It is also useful in slashing branches and undergrowth.

32.2. *Felling and Related Operations*

32.24 : 33.36.1 : 33.36.3. FINDLAY, W. P. K. **Summer-felled v. winter-felled timber.** *Timb. Tr. J.* 157, 1941 (275). [Forest Products Research Laboratory, Princes Risborough, Bucks.]

Temperature and other atmospheric conditions are the most significant factors in differentiating between winter and summer felling. Thus accelerated drying of green wood caused by high summer temperatures may result in excessive splitting, and summer conditions may increase the rate of growth of wood-destroying fungi. Early conversion, antiseptic treatment of log ends and storage in water are suggested as means of overcoming the adverse effects of summer conditions, and various precautions to be taken in regard to the seasoning of converted timber are discussed.

32.25 : 07.7. FLODMAN, B. En finsk handbok för huggare. **[A Finnish handbook for fellers.]** *Skogen* 28, 1941 (5–6). [Sw.]

This notice of a Finnish instructional brochure for woodmen includes illustrations of the types of axe heads used in Finland for felling, pruning, and cleaving, a scale diagram to show the dimensions and shape of 'Aro's standard axe haft', and photographs to illustrate the angles used in axe-grinding (edge ground to 30° and then honed to about 50°) and a type of wood-framed bow saw used for cross-cutting.

32.25 : 07.7. **Power saws at J. Neils.** *Timberman* 42 (7), 1940–41 (13, 36).

Three units of electric-powered chain saws are being used to fell and cross-cut 160,000 bd. ft. of timber per day in mixed Ponderosa Pine and Douglas Fir stands with timber averaging 30 in. diameter and about 14,000 bd. ft. per acre, two units doing the felling and one cross-cutting. Electric power is preferred to petrol because of flexibility of connexions and ease of starting, particularly in cold weather. Power is obtained by means of a D2 'Caterpillar' tractor to which is fitted a 12½ KVA generator, each saw having its own generating equipment, which is moved about to the trees to be felled. A new unit is being developed for use in limbing three sides of the felled tree in the woods.

32.25 : 33.02 : 82. KOROLEFF, A. **Study of pulpwood cutting technique.** *Pulp Paper Mag. Can.* 42, 1941 (376–8). [Canadian Pulp and Paper Association.]

A progress report of an investigation of the factors affecting the efficiency of a pulpwood cutter's working technique. Detailed notes and measurements were made on a complete day's performance of 10 cutters—5 high producers and 5 poor cutters—working under fairly similar conditions on each of a number of operations in progress with various company members of the Canadian Pulp and Paper Association.

32.29.1 : 07.7. Utilísima máquina para arrancar troncos. **[A useful stump-grubbing machine.]** *Revista Agricola, Guatemala* 17, 1940 (229–34). [Span.] L.S.

The tool described consists essentially of a hand winch suspended from a tripod which is mounted on two wheels to facilitate transportation. Attachment to (small) stumps is secured by means of hooks.

32.29.1 : 07.7 : 33.06. Pour l'exploitation actuelle intensive des bois de feu. **[For the present intensive exploitation of fuelwood.]** *J. for. suisse* 92, 1941 (109). [F.]

Description of a small instrument that facilitates the application of explosive charges in stump-grubbing.

32.9. *Transport*

32.91.1 : 76.1 : 22.14.2 : 33.02. BELOTELKIN, K. T., REINEKE, L. H., and WESTVELD, M. **Skidding in selective pulpwood logging.** *Tech. Note Ntheast. For. Exp. Sta.* No. 40, 1941. pp. 3.

Data from an experimental operation in a 65-year-old second-growth Spruce/Fir stand averaging 16 cords of merchantable wood per acre showed that cost of skidding was not greater for selection cutting than for clear cutting under similar conditions, that skidding time did not differ significantly with degree of cutting (10 to 60 per cent.) on the selection area, that skidding time was markedly reduced with increase in load volume, and that felling costs were higher in clear cutting than in selection cutting.

32.91.12 : 07.7. **Walking beam with rubber wheels.** *Timberman* 42 (7), 1940–41 (44).

A newly patented logging arch of the A-frame type in which a walking beam arrangement equipped with steel wheels and solid rubber tires has been substituted for crawler wheels. To surmount obstacles the rear wheels tip up and become the leading wheels.

32.91.22 : 38.3 : 32.96 : 07.7 : 76.1 (91.4). PONCE, G. **Motor truck log transportation in the Douglas Fir region and its possibilities in the Philippines.** *Philipp. J. For.* 3, 1940 (267–307). [Bureau of Forestry, Philippines.]

Rapid progress in road building and other factors give a considerable scope for truck logging in the Philippines, where at present this method is little developed. The author reviews the truck-logging practices in the Douglas Fir region of the U.S.A. and computes the cost of such logging under Philippine conditions. The cost of truck haulage per unit volume is shown to be slightly higher in the Philippines than in the Douglas Fir region, but is considerably lower in proportion to the eventual price of the timber hauled.

32.91.22 : 76.1 : 32.91.21 (485). PARDE, K. Virkesdrivning med hjultraktor. **[Logging**

with a wheeled tractor.] *Skogen* 28, 1941 (75–6). [Sw.] L.S.

Details are given of a Swedish logging operation in which the timber was skidded by horses and then hauled for 7 km. on sledges drawn by a Bolinder-Munktells Type 25 tractor. The machine worked quite satisfactorily for 46 working days, hauling more than 100,000 cu. ft. during this period, or about 2,100 cu. ft. per day. Five or six trips were made per day, the tractor hauling a single sledge carrying 334–557 cu. ft. per trip. Hauling costs, including cost and amortisation of tractor and sledges and all other charges, were about 5·4 öre per cu. ft.; skidding costs amounted to roughly 6 öre per cu. ft., so that the total cost of transport was about 11·4 öre per cu. ft. This is estimated to be 2·6 öre per cu. ft. less than the cost of hauling with horses and represents a saving on the whole operation of 2,600 kr.

32.95 : 07.7. **Torque converter tractor yarding units.** *W. Cst. Lumberm.* 68 (6), 1941 (14–5).

The units described are two Diesel 'Caterpillar' 75 tractors equipped with 3-drum Hyster units and are used for yarding by a highlead system to a maximum distance of 1,000 ft. One of the yarders is powered through a two-speed gear box in conjunction with a Twin Disc torque converter rated at 125 h.p. at 1,500 r.p.m. This torque converter adjusts the speed-pull of the unit with the difficulties of yarding as determined by topography and litter.

33. CONVERSION AND PRESERVATION OF WOOD

33.0. *Utilization Categories of Wood*

33.02 : 31.8 : 33.32. KOON, C. M., and KEEPERS, C. H. **The importance of dirt in the broomed ends of pulpwood bolts.** *Paper Tr. J.* 112 (1), 1941 (34–5). [Institute of Paper Chemistry, Appleton, Wis.] P.R.

Samples of chips from broomed ends of pulpwood bolts in most cases gave pulp of higher dirt content than those from unbroomed ends.

33.06 : 35 : 53. BALDWIN, H. I. **Experiments in marketing fuelwood.** *Fox For. Notes* No. 20, 1940. p. 1.

Experiments in the bundling of 2-ft. and 16-in. fuelwood indicate that it should be done at a central sawing plant and not in the forest and that improvements in the bundling apparatus are necessary. 4-ft. wood cut into 2-ft. and 16-in. lengths and re-piled fitted into a space 19 to 23 per cent. less than the pile of 4-ft. wood. Equivalents are given for side surface area and length of cord piles 4 ft. high of wood of different lengths.

33.06 : 33.36.3 : 33.19 : 34.6. KNUCHEL, H. Untersuchungen über Brennholzrüstung und Brennholzverwendung. I. Mitteilung. [**Investigations on the preparation and utilization of fuelwood. 1st Communication.**] *Mitt. schweiz. Anst. forstl. Versuchsw.* 21, 1940 (183–222). [G.g.f.]

In a series of seasoning experiments at Waldegg near Zurich the firewood was machine-chopped to lengths of 6 to 8 cm., stored in containers of varying width and having walls of wire grating, and exposed to the circulation of air. It was found that with a width of container of 80 cm. 3 to 4 charges per year could be seasoned to a final moisture content of about 20 per cent.

33.1. *Mechanical Conversion excluding the Manufacture of Mechanical Pulp*

33.13. Cooperage

33.13 : 33.15. RÜSCH, F., and SANDER, P. Ein bauchiges Fass aus Sperrholz. [**A plywood barrel.**] *Zeitschrift des Vereines Deutscher Ingenieure* 85, 1941 (338–40). [G.] P.R.

An account of the design and manufacture of seamless plywood barrels with concave ends, which, compared with the ordinary stave barrels, give a saving of 40 to 60 per cent. in wood and 30 to 75 per cent. in iron. These plywood barrels have been manufactured and used in large quantities by the I.G. Farbenindustrie, A.-G., and have proved to be at least equally as reliable as the older type.

33.15. Manufacture of Veneers and Laminated Wood. Gluing

33.15. JABLONSKY, B. **Improvements in or relating to articles of laminated wood.** *British Patent* No. 532,724, 29th January, 1941. pp. 7. P.R.

Specifications of various methods of obtaining a light but strong cellular structure in plywood and other laminated wood products, including 'improved' wood, by the provision of

corrugated layers or layers of individual hollow ribs.

33.15. LANG, A. A. D., and WHYTE, S. **Improvements in or relating to the manufacture of laminated wood structures.** *British Patent* No. 525,556. Building Sci. Abs. (*n.s.*) 14, 1941 (31). P.R.

The process consists in impregnating the wood with a heat-hardening substance and bonding it with a thermoplastic bonding agent or resin.

33.15 : 33.03 : 12.25–8. **[Veneer woods.]** *Wood Products* 46 (3), 1941 (36–7).

A table giving the commercial and botanical names, origin, colour range, figures, price range, hardness, and approximate maximum veneer sizes of the principal veneer woods.

33.3. *Chemical Treatment*

33.3 (494). PALLMANN, H., and SIEGRIST, H. Das Holz als landeseigener chemischer Rohstoff. **[Wood as a native chemical raw material.]** *Schweiz. Z. Forstw.* 92, 1941 (102–23). [G.]

A short survey of the principal methods of chemical wood utilization. At present many users in Switzerland compete for wood as a raw material. The complete replacement of pre-war imports of timber, coal, and liquid fuels would, in itself, involve raising the annual cut in Swiss forests by over 400 per cent.

33.32. Pulp and Paper Manufacture

33.32. PARRETT, A. N., and WOODRUFF, E. H. (to Rayonier Inc.). **Purifying wood pulp from resinous wood.** *U.S. Patent* No. 2,224,159, 10th December, 1940. Chem. Abs. 35 (1993). P.R.

A process of manufacturing from wood containing resins of high acid number, such as Slash Pine, etc., a sulphite pulp substantially free of resin and coloured matter, involves forming a mixture of sulphite pulp of a consistency in the range of 3–30 per cent. and a dilute solution of NaOH and Na_3PO_4 of such concentration that the spent liquor at the end of the treatment shall have a pH of not less than 11, and thoroughly and drastically mechanically agitating the mixture at a temperature of not less than 45° until the fibres acquire a fluffed and puffed effect.

33.32 : 33.02 : 12.25. SCHWARTZ, S. L., and BRAY, M. W. **Suitability of high-density, high-summerwood Slash Pine for kraft and high-grade papers.** *Sth. Pulp Paper J.* 3 (10), 1941 (8–13). [Forest Products Laboratory, Madison, Wis.]

A type of Slash Pine growing in south central Florida has a relatively high density and summerwood content. Experiments indicate that these characters influence both yield and quality of kraft and bleachable sulphate pulps, although the physical properties of the pulps are not correlated with them. Pulps from this wood may be used in certain high-grade papers.

33.32 : 33.02 : 12.26–8 : 31.3. SIKATA, M., and KIMURA, R. **Chemical investigations on pulp woods of Manchoukuo. VI. Fiber length, chemical analysis and cooking of hardwoods [*Ulmus macrocarpa* and *U. laciniata*].** *J. agric. chem. Soc. Japan* 16, 1940 (631–40); *Bull. agric. chem. Soc. Japan* 16, 1940 (115–9). [E.] Chem. Abs. 35 (1989). P.R.

33.32 : 34.6 : 33.15. TERAMOTO, T. **Pulp from waste veneer boards.** *Japanese Patent* No. 131,295, 24th July, 1939. Chem. Abs. 35 (1993). P.R.

The raw material is boiled in aqueous $NaHCO_3$, then in aqueous NaOH, beaten, bleached with bleaching powder, boiled in aqueous Na_2S, washed and rebleached.

33.32 : 33.39. HARRIS, E. E., and SHERRARD, E. C. **Simultaneous production of wood pulp and the conversion of the non-cellulosic constituents of wood into alcohols, oils, and resins.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*1218, 1940. pp. 3. P.R.

33.32 : 33.39. LECHNER, R. Die Pentosane des Holzes und ihre gärungschemische Verwertung. **[The pentosans of wood and their chemical utilization by fermentation.]** *Papierfabrikant* 38, 1940 (294–9). [G.] P.R.

33.33. Manufacture of Textiles from Wood

33.33 : 33.32. PALAZZO, F. C. **Improvements in or relating to processes for obtaining cellulose for the manufacture of rayon from resinous Pine woods.** *British Patent* No. 526,399, 17th September, 1940. pp. 3. P.R.

Details of the chemical processes employed.

33.34. Dyeing and Bleaching of Wood

33.34. KASIMA, H. **Coloring bamboo, wood and rattan.** *Japanese Patent* No. 129,606, 6th April, 1939. Chem. Abs. 35 (1964). P.R.

Colour produced by adding salicylic acid to a solution of iron salts is used.

33.36. Preservation of Wood. Seasoning and Drying

33.36. RABANUS, A. Der Schutz des Holzes gegen schädigende Einflüsse durch Pilze, Tiere, und Chemikalien. **[The protection of wood against injury by fungi, animals, and chemicals.]** *Chem. Fabrik* 13, 1940 (388). *Abstr.* in *Auszüge aus der Literatur*—suppl. to *Papierfabrikant* 39, 1941 (67–8). [G.] P.R.

A general review of the nature of injuries to wood by these agencies and of preservative processes and preservatives.

33.36.1. *Preservation against Attack by Plants and Animals*

33.36.1. DORIZZI-RYSER, S. **Impregnating building materials for increasing their resistance against rotting.** *Swiss Patent* No. 206,247, 1st November, 1939 (Cl. 80*h*). Chem. Abs. 35 (3058). P.R.

The material, which may be wood or cork, is heated and subsequently immersed in a melted paraffin composition which may be composed of pure paraffin or paraffin mixed with stearin or wax.

33.36.1 : 31.22.1 RAMSTETTER, H. Untersuchungen über die Aufnahmefähigkeit von Holzschutzmitteln bei feuchtem Holz. **[Investigations on the absorption of preservatives in moist wood.]** *Mitteilungen des Fachausschusses für Holzfragen beim Verein deutscher Ingenieure und Deutschen Forstverein* No. 26, 1940 (90–7). [G.] P.R.

The absorption capacity of wet Pine timber for synthetic oil-type preservatives was quite adequate and not inferior to that for preservatives derived from coal tar and for water-soluble salts.

33.36.1 : 33.31. **Standard distillation of creosote.** American Wood-Preservers' Association Manual of Recommended Practice, No. 11f, [revised ed.] 1941. pp. 6. P.R.

33.36.1 : 33.31. RABANUS, A. **The laboratory testing of wood preservatives. The behavior of wood treated with copper sulphate.** *Holz* 3, 1940 (233–8). Chem. Abs. 35 (1596). P.R.

If wood is treated with water by the Boucherie process, the loss in weight of test blocks due to controlled decay is about the same as that of untreated controls; this shows that the influence of nutrient materials in the sap is negligible. The amount of $CuSO_4$ required to protect wood against different fungi varies greatly. Leaching tests support the claim frequently made that some of the Cu is fixed in the wood. The formation of basic Cu carbonate in the wood is assumed. In artificial culture media, $CuCO_3 \cdot Cu(OH)_2$ and Cu_2O are as toxic as $CuSO_4$ toward 5 fungi but much less so toward 7 others. Small test blocks that were treated with $CuSO_4$, dried, and then treated with Na_2CO_3, resisted attack by 3 fungi but were badly decayed by 3 others. The Cu is leached more rapidly from poles set in soil rich in decaying nitrogenous material, probably because of the solvent action of NH_3. Except for this the nature of the soil is of minor importance; it is the distribution of different species of fungi that explains the inconsistent results obtained with $CuSO_4$-treated wood.

33.36.1 : 33.31. **Wood preservation: the use of pentachlorphenol.** *Timb. Tr. J.* 157, 1941 (274).

Pentachlorphenol has been shown to have high qualifications as a wood preservative. To prevent blue stain and similar conditions in green wood it can be applied in aqueous solution in the form of a soluble sodium salt and after application is precipitated as insoluble pentachlorphenol and remains evenly distributed in the wood. In the treatment of dry wood satisfactory results may be obtained with a 5-per-cent. solution of pentachlorphenol in a suitable colourless petroleum solvent, desirable standards for which are provided by Commercial Standard No. 1 Fuel Oil (U.S. Federal Specification), plus small amounts of Pine oil and ester gum. Pressure treatment of fence posts is effective against decay, termites and marine borers, and dipping treatment is most effective for lumber infested with *Lyctus* and other powder post beetles. Sufficient knowledge is available to prescribe the precautions required in handling this chemical.

33.36.1 : 33.31. HUBERT, E. E. **Preservative treatment of timbers with Permatol.** *Timberman* 42 (1), 1940–41 (17–26). [Western Pine Association.]

Particular advantages of the Permatol group of preservatives include cleanness of treatment, ease of penetration, permanency, paintability and low cost, and they show high resistance to decay and termites. Formulae are listed for a number of these preservatives that have been developed primarily for use in treating milled products. Treating schedules, based on laboratory tests, are given for Permatol A solution with different products of Ponderosa Pine and White Fir (*Abies concolor*), and special treating methods are presented for use with timbers already in position in structural units.

33.36.1 : 33.31. HÄGER, B. Virkeskonservering med svårlösliga arsenikföreningar. **[Timber preservation with comparatively insoluble arsenic compounds.]** *Skogsägaren* 17, 1941 (66–9). [Sw.]

A popular account of the Boliden preservative process [*For. Abs.* 2 (60)], including a description of its application by open-tank and pressure treatments. Special points made are that:—(i) Whatever method of impregnation is used, the treated timber must undergo a period of air drying, during which it assumes a faint green colour. When once air-dry it can be handled with complete safety, is odourless, and can be painted. (ii) Leaching tests show that 65 per cent. of the arsenic acid precipitated in the wood is permanently fixed there. (iii) The treatment gives complete protection against wood-rotting fungi and shipworm for at least 6 years, and has proved effective against termites for 3 years. Tests are still in progress and are expected to give further satisfactory results. Treated timber is non-poisonous to warm-blooded animals.

33.36.1 : 33.31 : 31.42.1. HAY, H. R. (to Monsanto Chemical Co.). **Preserving wood.** *U.S.Patent* No. 2,209,970, 6th August, 1940. Chem. Abs. 35 (298). P.R.

A method is specified of preserving wood against *Fomes annosus*, green mould, and *Ceratostomella pilifera*, without substantially increasing its resistance to fire and water or adversely affecting paints or varnishes subsequently applied, by treatment of the green wood with pentachlorophenol or its metallic salts at a suitable concentration.

33.36.1 : 33.31 : 31.42.12. ÖRNHJELM, R. **[Manufacture of a home-produced preparation against blue stain in sawn timber.]** *Papp. TrävaruTidskr. Finl.* 22, 1940 (459–64). *Abstr.* in *Auszüge aus der Literatur*—suppl. to *Papierfabrikant* 39, 1941 (63). P.R.

The Kymmene Company in Finland has taken up production of a pentachlorophenolate preparation known by the trade name of Ky 5. The preparation does not form dust, is readily soluble in cold water, and does not cause eczema either during manufacture or use. It is said to be equivalent in effectiveness to Dowicide.

33.36.1 : 33.31 : 31.42.12. VERRALL, A. F. **Fungi associated with stain in chemically treated green lumber.** *Phytopathology* 31, 1941 (270–4). [Bureau of Plant Industry, U.S.D.A.]

Test lumber of Pine (Shortleaf, Longleaf, and Loblolly) and hardwoods (mostly Red Gum) was either left untreated or dipped for about 5 seconds in 0·31 per cent. Lignasan or 1·03 per cent. Dowicide P, representing the two groups of anti-stain chemicals—organic mercuries and chlorinated phenols—in general commercial use. Untreated and treated material was then stacked at random in the same pile, but Pine and hardwoods were usually stacked separately. Comparisons were subsequently made of stain-fungus floras developing on treated and untreated lumber. In Pine, both treated and untreated, stain was due mainly to *Ceratostomella pilifera*, with *C. ips* second in importance. Of staining that occurred in spite of Lignasan treatment, the proportion caused by the various fungi was almost the same as that in untreated material. Dowicide P seemed rather less effective than Lignasan against *C. pilifera* and relatively more effective against moulds and the 'dark, undetermined' group of fungi. In hardwood lumber both treatments reduced the proportion of stain caused by *Ceratostomella pluriannulata*, *Graphium rigidum*, and *Diplodia natalensis*; the last-named, in particular, was never isolated from treated lumber. *Endoconidiophora caerulescens* was less easily controlled by treatment than the staining fungi in general, but the 'dark, undetermined' group also appeared to be less easily controlled than the corresponding group in Pine. Lignasan was apparently less effective than Dowicide P against *G. rigidum* and *C. pluriannulata*. Preliminary tests with ethyl mercuric phosphate, sodium tetrachlorophenolate, and sodium pentachlorophenolate indicated that there are no differences in stain-fungus floras on lumber treated with these and

the two chemicals extensively tested. The differences between the floras of treated and untreated stained lumber seemed insufficient to explain the occasional instances of bad staining in treated lumber, and it is likely that such cases are usually due to poor handling practice rather than to direct failure of the treatments. Practices probably responsible for the failure of chemical treatments in the southern United States are too long storage of logs, which encourages infection by beetle-carried fungi, and too long an interval between milling and treatment. Long periods of weather unfavourable to seasoning may result in general failure of treatments, but appear to be a less frequent cause than faulty handling.

33.36.1 : 33.31 : 31.43 : 13.2. **New treatments for *Lyctus* and ambrosia beetle control.** *Sth. Lumberm.* 163 (2047), 1941 (58–9).

A note on commercial preparations for control of *Lyctus* and ambrosia beetles. 'Lyctocide 1' (Mike sulfur) is a cheap preventive treatment against *Lyctus* to be applied to freshly-cut stock and 'Lyctocide 2' is an oily solution for use in treating seasoned lumber and finished products. 'Ambrocide' may be applied either as an oil solution or water emulsion to protect freshly-cut lumber from ambrosia-beetle attack.

33.36.1 : 33.31 : 31.43 : 13.2. WILSON, H. B. **How to prevent and control borer attack in Australian timbers.** *Aust. Timb. J.* 7, 1941 (105–6).

A semi-popular account dealing with the boric-acid treatment to prevent *Lyctus* attack and with three methods for preventing the spread of *Lyctus* or *Anobium* damage. These include heat sterilization, fumigation, and the injection into the wood of poisonous chemicals, particularly a solution of one part paradichlorbenzene in ten parts kerosene. It is pointed out that borer holes are usually of little consequence in building timbers, that *Lyctus* spreads rapidly through susceptible material and timber not attacked in a relatively short time may be considered immune.

33.36.1 : 33.31 : 31.43 : 13.2. UNITED STATES. **Twentieth annual report of the Southern Forest Experiment Station, January 1—December 31, 1940.** New Orleans, La. [1941]. pp. 39.

End-racking will safeguard green lumber from ambrosia-beetle attack for periods up to 15 days and sprays of dichlorodiphenyloxide and other chemicals appear to be a protection against these beetles (p. 21).

33.36.1 : 33.31 : 31.43 : 13.2. MORLEY, P. M. **Some possibilities in control of the Pine sawyer beetle by chemical methods.** *Rep. ent. Soc. Ont.* 70, 1939 (93–5). [Forest Insect Investigations, Division of Entomology, Ottawa.] L.S.

Of a number of repellants and stomach insecticides tested as sprays against *Monochamus* spp. in log piles, only a lime/sulphur/sodium-arsenite preparation gave promise of control, the average number of larvae after 10 weeks being 2 per treated and 27 per untreated log. Further work is being done to determine the best proportions for the constituents and to assess the value of stickers. No tests have yet been made on a commercial basis. Tests were also made on a number of contact insecticides applied as oil sprays, including fuel oil/naphthalene, fuel oil/crankcase oil/creosote, orthodichlorbenzene, pentachlorphenol, 'permatol', and 'M.B.C.24'. Many of these, though effective, are too expensive for direct use, but might be made cheaper by dilution with fuel oil; e.g. a 1:7 mixture of 'M.B.C.24' with fuel oil was almost as effective as the undiluted spray. Some of the oil sprays were tested on a commercial scale, using a standard fire pump equipped with a reducing nozzle, and it was shown that ordinary fire-fighting equipment can be used satisfactorily for this purpose. With oil sprays the larval mortality was greatest on hot days.

33.36.1 : 33.31 : 31.43 : 13.2. UNITED STATES. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1940.** Superintendent of Documents, Washington, D.C., 1940. pp. 128.

Orthodichlorobenzene, monochloronaphthalene, or naphthalene, mixed with fuel oil or kerosene, were found to be the most effective substances of those tested for protecting Elm wood from attack by bark beetles and other insects (p. 25).

33.36.1 : 33.31 : 31.43 : 13.2. TURNER, N. **Termites and their control.** *Pests* 9 (3), 1941 (22–7). Chem. Abs. 35 (2692). P.R.

Chemical and other types of control are discussed. Na_2HAsO_3, creosote and β-napthol are established for soil treatment. Trichlorobenzene, penta- and tetrachlorophenol and monochloronaphthalene are among the more promising new materials.

33.36.1 : 33.51 : 33.31. BOWEN, J. W., and LOMBERG, B. R. **The preservation of mining timber, with particular reference to the effect of air pressure, moisture content, initial vacuum and temperature on the absorption of preservative.** *Journal of the South African Institution of Engineers* 39, 1940 (1–10). L.S.

Details are given of experiments on the pressure treatment of *Eucalyptus saligna* and *Acacia mollissima* with an aqueous preservative solution known as 'Yard Mixture', consisting of 3 per cent. zinc sulphate plus 0·3 per cent. triolith (a proprietary mixture of about 55 per cent. sodium fluoride, 35 per cent. sodium bichromate, and 10 per cent. dinitrophenol). The strength of the solution is regarded as adequate for general use, but it is recommended that at suitable intervals all timbers needed for special purposes should be treated with a solution of 4 per cent. zinc sulphate and 0·6 per cent. triolith and laid by until required. The maximum absorption for any given period of treatment was attained only at the maximum pressure used (110 lb./sq. in.). At a pressure of 70 lb./sq. in. absorption was 82 per cent. of that at maximum pressure. It is therefore urged that treating plants should use the greatest pressure available and that this pressure should not be less than 70 lb./sq. in. Absorption over a period of 20 mins. was about 82 per cent. of that over 1 hour, so that the latter period may prove advantageous for special purposes where a high absorption is required. The gain in absorption from heating the solution to temperatures up to 80° C. is considered too slight to justify this practice. Proper seasoning of the timber, however, is important, as the uptake of preservative was shown to rise steadily with falling moisture content. Of the two test timbers, *E. saligna* is the lighter and more porous, absorbing almost twice as much preservative as *A. mollissima* and being less durable than the latter when untreated, though in the treated condition their durability is about equal. Using a vacuum of 23 in., the appropriate initial vacuum periods were found to be 5 mins. for the former and 10 mins. for the latter species. Diagrams are appended to show the typical lay-outs of a large-scale and a small-scale treating plant.

33.36.1 : 33.52 : 12.25 : 31.0 : 31.27 : 33.91. **Creosoted sleepers of British Columbia Douglas Fir.** Trade Extension Department, B.C. Lumber and Shingle Manufacturers' Association, Vancouver. pp. 26. P.R.

A trade booklet containing information on the general characteristics of Douglas Fir, reasons for and methods used in preservative treatment, inspection and care of, and financial gains from the use of treated sleepers. Appendices are given to show the strength properties of the timber, the standard creosoting grade for Douglas Fir sleepers and crossing timbers for export, the standard specification for treatment by the boiling-under-vacuum, empty-cell process, and the American Wood-Preservers' Association standard specification for creosote.

33.36.1 : 33.53. **Standard specification for the preservative treatment of pole butts by the non-pressure process—incising method.** American Wood-Preservers' Association Manual of Recommended Practice, No. 43c, [revised ed.] 1941. pp. 2. P.R.

33.36.1 : 33.53. PALMER, J. W. **Creosoting of poles: new and efficient method.** *Aust. Timb. J.* 7, 1941 (70–1).

Complete impregnation of the sapwood of hardwood poles results in effective protection against termites and fungi and increases the life of the poles 33 per cent. The method, which takes 6 days, consists in fitting a cap to the butt end of the pole, which is raised 3 ft. higher than the top end, and admitting creosote through the cap by means of a $\frac{3}{4}$-in. pipe leading from a 5-gal. drum elevated 23 ft. above the ground, thus providing a pressure of approximately 9 lb. per sq. in. Eight lb. of creosote per cu. ft. of sapwood was used in the treatment. Operational details are given.

33.36.1 : 33.53. GEWECKE, H. **Absorption of treating solutions and completeness of treatment in sap-displacement processes with modern salt mixtures.** *Holz* 3, 1940 (321–5). Chem. Abs. 35 (1597). P.R.

In the treatment of telephone poles with arsenate/chromate/fluoride mixtures by the Boucherie process, the amount of chemical introduced is 12–15 times that required to inhibit decay. A simple method of estimating the treatability of any wood by means of small test pieces is described.

33.36.1 : 38. **Standard instructions for field treatment of creosoted timber and piles.** American Wood-Preservers' Association Manual of Recommended Practice, No. 48b, [revised ed.] 1941. p. 1. P.R.

33.36.1 : 38.2. BARCLAY, J. B. **Treated timber chief item in Boeing aircraft plant.** *B.C. Lumberm.* 25 (7), 1941 (51–2, 61).

Data are given on the architecture and design, materials, and assembly and erection of a factory building covering an area of 5·25 acres. The common Douglas Fir timber used for all structural members was treated with zinc chloride at the rate of ¾ lb. per thousand bd. ft.

33.36.2. *Fireproofing*

33.36.2. FARQUHARSON, R. A. **The fire blockade.** *B. C. Lumberm.* 25 (7), 1941 (40, 42). *Repr.* from '*C-I-L Oval*', June 1941.

Wooden trusses used in the construction of airplane hangars in Canada are prefabricated and treated with zinc chloride as a preservative and fire retardant.

33.36.2 AUSTRALIA. **Fourteenth annual report of the Council for Scientific and Industrial Research for year 1939-40.** Govt. Printer, Canberra. 1940. pp. 102.

Tests have been completed and treating schedules developed for the fireproofing of certain Australian and imported timbers (p. 52).

33.36.2. LINTNER, B., and UNGVÁRY, J. **Fireproofing wood or cellulose.** *Hungarian Patent* No. 126,177, 1st February, 1941. Chem. Abs. 35 (3414). P.R.

Wood or cellulose is impregnated or coated with a solution formed by dissolving bauxite in H_2SO_4, adding 15 per cent. excess of NaOH and diluting to 20–5° Bé., or with a solution formed by dissolving dolomite in HCl, neutralizing and diluting to 25–30° Bé.

33.36.2. HERZ, W. **Fireproofing composition suitable for treating cloth, paper, wood, etc.** *U.S. Patent* No. 2,225,831, 24th December, 1940. Chem. Abs. 35 (2251–2). P.R.

Approximately equal proportions are used of borax, acid NH_4 phosphate and alkaline NH_4Cl together with not more than 10 per cent. of irradiated dextrin as an adhesive agent (the acid properties of the NH_4 phosphate being neutralized by the borax and the NH_4Cl in the mixture).

33.36.2. ODA, N. (to Nippon Soda K.K.). **Fireproofing wood or cloth.** *Japanese Patent* No. 132,438, 4th October, 1939. Chem. Abs. 35 (3414). P.R.

The material is treated in aqueous Na aluminate and heated to deposit Al_2O_3 or other insoluble Al compounds in the tissues.

33.36.3. *Seasoning. Drying*

33.36.3. ROESLÈ, A. **Stabilization and drying of wood.** *Swiss Patent* No. 206,775, 1st December, 1939 (Cl. 80*h*). Chem. Abs. 35 (3058). P.R.

Moist wood is heated a long time in a drying chamber above 100°. Albuminoids, glycide, saccharine matter, and terpenes are so changed chemically that the hygroscopicity and therefore the subsequent swelling and shrinkage are lowered. After this condition is reached the wood is dried by heated air. The air saturated with steam is repeatedly driven off until the desired degree of drying is attained.

33.36.3 : 07.7. PIEST, H. Trockenanlagen für Kleinbetriebe. [**Drying kilns for small businesses.**] *Mitteilungen des Fachausschusses für Holzfragen beim Verein deutscher Ingenieure und Deutschen Forstverein* No. 28, 1940 (20–8). [G.] P.R.

A discussion of the principles of construction of small drying kilns for use in artisans' workshops. Electricity is especially promising as a source of heat for such kilns, since it allows of automatic regulation of temperature without extra cost.

33.36.3 : 07.7. FESSEL, F. Feststellungen über strömungstechnische und wärmetechnische Verbesserungen des Trockenraumes. [**Investigations on improvements in the technique of air circulation and heating in drying chambers.**] *Mitteilungen des Fachausschusses für Holzfragen beim Verein deutscher Ingenieure und Deutschen Forstverein* No. 28, 1940 (29–48). [G.g.] P.R.

Report on various improvements, arising from tests and experience, in the design and operation of drying kilns at the Siemens & Halske A.G. High air velocities (1·3 to 2 metres per second) are recommended.

33.36.3 : 07.7. EGNER, K. Aus neueren Versuchen über Schaukeltrocknung. [**Notes from recent experiments on 'swing-rack' seasoning.**] *Mitteilungen des Fachausschusses für Holzfragen beim Verein deutscher Ingenieure und Deutschen Forstverein* No. 28, 1940 (49–58). [G.] P.R.

The "swing-rack" is a patented device that holds the material to be seasoned and is swung by means of a motor. Previous investigations at Stuttgart [cf. *For. Abs.* 2 (59)] have now been supplemented by further tests with a larger type of rack. The machine hastened air seasoning up to fibre-saturation point, the

acceleration being greatest when the weather was unfavourable to seasoning. Whether the extra expenditure involved by the use of the machine is warranted probably depends on local conditions.

33.36.3 : 07.7. MERKEL, F. Über den Einfluss des Sprühens auf die Spannungen im Holz während des Trocknens. **[On the influence of air conditioning with steam upon the stresses in wood during seasoning.]** *Mitteilungen des Fachausschusses für Holzfragen beim Verein deutscher Ingenieure und Deutschen Forstverein* No. 28, 1940 (59–75). [G.] P.R.

Interim report on an investigation to determine the minimum initial air humidity in kilns at which seasoning can be carried out without setting up harmful stresses. The occurrence of splits was used as a criterion for the existence of such stresses. An initial temperature of about 70° C. and an initial humidity of about 80 per cent. allowed of long and hence effective seasoning of Oak specimens without formation of splits. Otherwise the investigation was inconclusive, being on too small a scale.

33.36.3 : 07.7. CZEPEK, R. Bericht über die Holztrocknungsversuche im Elektrowärme-Institut in Essen. **[Report on the seasoning experiments at the Elektrowärme-Institute, Essen.]** *Mitteilungen des Fachausschusses für Holzfragen beim Verein deutscher Ingenieure und Deutschen Forstverein* No. 28, 1940 (76–87). [G.] P.R.

33.36.3 : 31.42.12. SCHEFFER, T. C. **Drying rates of blue-stained and bright lumber.** *Wood Products* 46 (3), 1941 (23–5). [Bureau of Plant Industry, U.S.D.A.]

From experiments with sample boards of Loblolly Pine (*Pinus taeda*) and Sweet Gum (*Liquidambar styraciflua*) under extensively controlled conditions it is shown that blue-stained lumber has a faster initial drying rate than bright lumber, and it is concluded that under the same periods and conditions of drying and with adequate protection against rain, there will be little or no difference between the moisture content below fibre-saturation point of stained and bright lumber, and that under comparable drying conditions the shipping moisture content should be the same for both conditions of lumber.

33.36.3 : 33.31. CANADA. **Report of the Lands, Parks and Forests Branch for the fiscal year ended March 31, 1940.** *Repr.* from the Annual Report of the Department of Mines and Resources, pp. 60–135. King's Printer, Ottawa, 1941.

In seasoning tests with White Pine material 3 in. thick, treated with sodium chloride and air dried for 1 year, the salt prevented checking but did not increase the drying rate or affect shrinkage. Both for this species and for Maple it was found that most of the salt was concentrated near the surface of the wood at the end of seasoning (pp. 127–8).

33.36.3 : 33.36.1 : 31.42.11 : 12.25. CANADA. **Report of the Lands, Parks and Forests Branch for the fiscal year ended March 31, 1940.** *Repr.* from the Annual Report of the Department of Mines and Resources, pp. 60–135. King's Printer, Ottawa, 1941.

Lumber of Western Hemlock, Balsam Fir, and Western Red Cedar, infected with rot organisms, was sterilized after kiln drying for 6 days at 130° F. and a constant relative humidity of 50 per cent. (p. 132).

33.37. Distillation. Manufacture of Tar

33.37 (485). **[Wood tar as a motor fuel in Sweden.]** *Chem. Industrie* 64, 1941 (100). Fuel Res. Summ. 1941 (566). P.R.

Swedish experiments have shown that wood tar is a satisfactory fuel for two-stroke engines, and that crude tar mixed with turpentine and methanol gives the best results. The amount of wood tar available in Sweden is only 8,000 tons per year.

33.38. Charcoal Manufacture. Use of Wood and Charcoal in Producer-Gas Generators

33.38.1. BERGSTRÖM, H. **Quantity and composition of exit gases from charcoal burners and wood carbonizing kilns.** *I.V.A.* 1940 (3), (107–9). Fuel Res. Summ. 1941 (396). P.R.

33.38.1. **Determination of the water content and ignition loss of wood charcoal.** *I.V.A.* 1940 (3), (109–12). Fuel Res. Summ. 1941 (396). P.R.

33.38.1 : 07.7. GOLIGHTLY, H. H. **Kilns for the production of wood charcoal.** *British Patent* No. 535,028, 1941. Fuel Res. Summ. 1941 (340–1). P.R.

Constructional details.

33.38.1 : 07.7. GOLIGHTLY, H. H. **Kilns for the production of wood charcoal.** *British Patent* No. 535,047, 1941. Fuel Res. Summ. 1941 (340). P.R.

Constructional details.

33.38.1 : 07.7. **Q.F.S. vented brick kiln for charcoal burning.** *Aust. Timb. J.* 7, 1941 (63, 100).

The design and operation of a brick kiln, which has been developed by the Queensland Forest Service, are described and illustrated. Cost of materials and labour is given as £28. This kiln is said to give a high-quality charcoal and a recovery of at least 25 per cent. by weight of charcoal from timber of about 20 per cent. moisture content.

33.38.1 : 07.7 (944). **Report on the construction and operation of the N.S.W. Forestry Charcoal Producing Plant.** Forestry Commission of N.S.W., Sydney, 1941. pp. 15.

Report on the method adopted by the N.S.W. Forestry Commission for handling, treating, and disposing of charcoal burnt. As the centralization of production was out of question owing to the bulkiness of both raw material and finished product, the only possibilities of reducing costs lay in developing suitable simple aids to manual labour, and in introducing a carefully planned continuous technological process. After a period of experimenting, at the Pennant Hills Experimental Station and elsewhere, charcoal burnt in bee-hives or in pits dug in the ground was condemned because of an excessive amount of foreign matter. The Princes Risborough type of metal kiln was adopted as standard by the Commission, and the quality of charcoal produced in these kilns, as well as their convenience in operation and control, were found to be entirely satisfactory. The kilns are round in plan, about 7 ft. 3 in. in diameter, consisting of two 4 ft. sections, a flat conical cover, air inlets, chimneys, etc. When the kiln is cooled, its cover and top section are removed, and charcoal has to be shifted for some distance vertically, as well as horizontally, in order to reach the crushing and screening plant. A detailed description is given of the design for the charcoal-producing local centre in the forest and its various components, as worked out by the Engineering Section of the Division of Forest Management. Eleven kilns are arranged on the circumferences of two intersecting circles, one kiln having its centre on an intersection of the circles, and groups of five kilns each being disposed on the right and left ring respectively. The spacing of the kilns must be such as to leave room between two kilns for the kiln cover when removed. The total number of kilns in the plant may be increased to fifteen if desired. If full capacity is not required, one ring of kilns may be used only, with five kilns normally, and a maximum of six. In the centre of each ring a rotating wooden crane is located, the main member of which consists of a solid Ironbark pole. This crane is worked manually and has a swing of 360°. It serves for handling timber and loading it into the kilns, removing and assembling kiln parts, hoisting up charcoal in a box, swinging it into position over the top of the screening plant, and releasing it there. The crane is built for normal handling of 600 lb. live load. From actual experience, the cost of such a crane completely assembled is about £A50, of which $\frac{1}{3}$ falls on the cost of labour and $\frac{2}{3}$ on the cost of materials. With its centre approximately on the second intersection of the two circles, the screening plant is arranged to serve both rings of kilns. This plant, called the 'N.S.W. Forestry Duplex Charcoal Screening Plant', is built for manual operation and gravity flow of charcoal. The frame-work of the plant is of roughly sawn timber. The charcoal is released on to a platform at the top of the plant, part falling through 1¼-in.-mesh screens, and part being forced through the screens with a shovel. The charcoal then rolls down ⅜-in.-mesh screens, and the fraction failing to pass these screens falls into bins as graded charcoal ready for bagging and disposal. Particles falling through the ⅜-in.-mesh screens may be further segregated, if desired. The bins in which the graded charcoal collects have a series of nine closable openings on each side of the plant, eighteen altogether, through which the charcoal is fed into bags. For one ring of kilns, only one effective half of the screening plant need be built, nine bags being filled simultaneously in this case. A complete 'Duplex' plant costs about £A50, of which approximately 40 per cent. falls on the cost of labour, 30 per cent. on timber, and 30 per cent. on screens and other materials. A gang of two men constitutes the smallest unit required for continuous operation of a single five-kiln ring. With a full two-ring plant of eleven kilns, two two-man gangs are required, while five to six men are needed to run a two-ring plant with

fifteen kilns. The weekly capacity of the plant, assuming reasonably dry timber, is as follows:—Single-ring plant of five kilns and one two-man crew: 5 kiln loads of charcoal, screened and bagged. Double-ring plant of eleven kilns and two two-man crews: 10 kiln loads. Single-ring plant of six kilns and one three-man crew: 10 kiln loads. Double-ring plant of twelve kilns and two three-man crews: 20 kiln loads.

33.38.1 : 33.38.2. BERTHELOT, C. **Manufacture of mixed briquettes of coal and wood charcoal.** *Gén. Civ.* 117, 1941 (165–9). Fuel Res. Summ. 1941 (394). P.R.

The author describes the manufacture of 'Actigaz' briquettes from coal and wood charcoal for use in automobile gas producers. Experimental results are given.

33.38.1 : 33.38.2. MINAMI, T., and KAWAUTI, A. **Charcoal for gas generators.** *Japanese Patent* No. 130,978, 7th July, 1939. Chem. Abs. 35 (1971). P.R.

When carbonization is nearly complete, water in the form of mist is sprayed over the redhot carbonized material, then air is admitted and the carbonization completed, and water is introduced to quench the charcoal. This treatment produces a rough, porous charcoal that gives uniform generation of gas in generators for automotive engines.

33.38.2. TOBLER, J. **Investigations on wood carbonization with special reference to the processes in wood-gas producers.** *Monatsbull. schweiz. Ver. Gas- u. Wasserfachm.* 20, 1940 (113–21, 143–9, 165–9). Fuel Res. Summ. 1941 (237). P.R.

33.38.2. STEVENSON, D. D. **French turn to gazogenes during war period.** *J. For.* 39, 1941 (489–90). [Pennsylvania State College.]

At the beginning of 1941 an effort was being made to have 50,000 gazogene-equipped cars in France. Forty thousand charcoal furnaces were ordered by the Ministry of Production to help supply fuel for these units. This is creating a use for wood in small sizes and suitable thinnings can now be marketed profitably.

33.38.2. **Producer gas for motor traction.** Forestry Commission of New South Wales, Sydney. 1941. pp. 24. P.R.

A revised edition of the pamphlet recorded in *For. Abs.* 2 (153).

33.38.2 (485). MOLIN, A. **Gasification of wood in Sweden.** *Year Book of the Association of Swedish Gas Works*, 1937, Part II. Abridged in *Monatsbull. schweiz. Ver. Gas- u. Wasserfachm.* 20, 1940 (121–2). Fuel Res. Summ. 1941 (236). P.R.

33.38.2 : 07.7. THOMSEN, A. M. **Use of wood waste in gas producers.** *U.S. Patent* No. 2,228,616, 14th January, 1941. Chem. Abs. 35 (3066). P.R.

An arrangement of apparatus is described, and a method of increasing the mechanical efficiency of a gas producer operating upon wood waste which involves separating the charge into two portions, one relatively coarse and the other relatively fine, commingling the fine portion with such as a heavy oil or tar that will leave a coherent carbonaceous residue on distillation, and charging the resulting magma together with the coarse portion into the producer.

33.38.2 : 07.7 (485). SYLVAN, S. G. **Wood-gas drive for lorries.** *Tekn. Tids.* 70, 1940 (51), *Autom. o. Motortekn.* (13), (93–8). Fuel Res. Summ. 1941 (529). P.R.

A review of development in Sweden, with accounts of producer equipment and the processes concerned. The economic advantage of wood over charcoal is shown by the following comparison:—20 hl. wood corresponds to 240 l. petrol as against 80 l. from charcoal. Consumption of wood = 0·18 kg./t. km. = 58 l./100 t. km. = 1·90 kr.; charcoal 0·12 kg./t. km. = 75 l./100 t. km. = 4·50 kr.

33.38.2 : 33.06 (68) : 31.2 : 31.3. HALL, P. E. **Notes on the analyses of certain South African woods with special reference to their use as producer gas generator fuels.** *Journal of the Chemical, Metallurgical and Mining Society of South Africa* 40, 1939–40 (350–2). L.S.

The investigation was carried out jointly by the Forest Products Institute and the Fuel Research Institute. The woods tested were:—*Eucalyptus cladocalyx, E. saligna, E. paniculata, Acacia karroo, A. saligna, A. cyclopis, A. mollissima, Pinus insignis, P. pinaster, P. patula, P. longifolia,* and *P. caribaea.*

The analytical tests made on each sample included: (1) specific gravity, (2) proximate analysis, and (3) low temperature carbonization assay. (1) *Specific gravity*: Among the three *Eucalyptus* woods the variation in specific gravity was large (0·57 for *E. saligna* and 1·03 for *E. paniculata*) though generally speaking the specific gravity could be classed as high.

For *Acacia* woods the results were not nearly so variable (0·68–0·86) and the group as a whole is of medium specific gravity. The *Pinus* species have a fairly wide variation (0·38–0·65) and on the average a relatively low specific gravity. (2) *Proximate analysis*: The ash contents are comparatively low for the *Eucalyptus* and *Pinus* species (0·3–0·5 per cent.) but for the Acacias three out of the four show about 0·9 per cent., while *A. mollissima* gives 0·4 per cent. The moisture figures are reasonably constant for all the woods, ranging between 8·5 per cent. and 10·0 per cent. As might be expected the *Acacia* group is definitely, though not markedly, drier than the others. The calorific values lie between 7,410 and 7,820 B.T.U's/lb. except for *Pinus caribaea*, which has the abnormally high figure of 8,470 B.T.U.'s/lb. (3) *Low temperature carbonization assay*: (*a*) *Eucalyptus* woods: There is a considerable variation in the low temperature assay yields from these timbers. The charcoal figures are approximately 24 per cent. for both *E. cladocalyx* and *E. saligna* but only 20–21 per cent. for *E. paniculata*. The last-named on the other hand gives a very high tar yield—28 per cent.—as against 21 per cent. for *E. saligna* and about 10 per cent. for *E. cladocalyx*. The total gas yields and CO_2 yields do not differ materially for the three timbers but *E. cladocalyx* gives a much higher liquid content. (*b*) *Acacia* woods: With the exception of *A. cyclopis* the Acacias give approximately 24 per cent. of charcoal, 13½–17 per cent. tar, approximately 40 per cent. of liquor and 10 per cent. of CO_2. *A. cyclopis* has somewhat higher charcoal and lower tar yields. (*c*) *Pinus* woods: This group in general gives higher yields of charcoal (27 per cent.) and somewhat lower gas yields (CO_2 and residual gas) than either the *Eucalyptus* or the *Acacia* groups. The tar contents are average and the liquor contents slightly below average (37 per cent.). *Pinus pinaster* gives comparatively high tar and liquor yields with a correspondingly low charcoal content.

While from these analyses there does not appear to be any marked difference between the woods submitted, the following points are noted—(*a*) The *Eucalyptus* group: In general these should prove to be suitable fuels. Their specific gravity is high, the ash content is low, the charcoal yield good and the tar content fair. *E. saligna* has a somewhat low specific gravity and *E. paniculata* a high tar and low charcoal yield. (*b*) The *Acacia* group: Woods of this group should prove reasonably satisfactory, the charcoal yield being fair, the specific gravity being medium and the tar yield being fairly low. (*c*) The *Pinus* group: A comparatively low specific gravity makes these woods less suitable, especially for portable generators. On the other hand the charcoal yield is higher than for the other two groups.

33.38.3 : 33.7. AAMOT, O. C. **Economical wood firing from the chemico-metallurgical point of view.** *Tidskr. Kjemi Bergves.* 20, 1940 (138–40). Fuel Res. Summ. 1941 (544). P.R.

The author recommends that wood should be converted into charcoal before it reaches the real combustion zone in the furnace in order that the calories in the wood may be more efficiently utilized, and describes a method for impregnating the wood to protect it from exothermic combustion.

33.39. Manufacture of Sugar, Oils, Alcohol, and Vinegar from Wood

33.39 : 33.32 (485). HÄGGLUND, E. Redogörelse för verksamheten vid Cellulosaindustriens Centrallaboratorium 1940. **[Report on the activity of the Central Laboratory of the Swedish Pulp Industry 1940.]** *Svensk Pappersmasse-Tidn.* 18, 1941 (92–5). [Sw.] P.O.

Both the Hägglund-Bergius and the Scholler processes for saccharifying wood involve high establishment costs, and in view of Sweden's shortage of alcohol fuel experiments have been started in an effort to find cheaper processes. Preliminary laboratory trials have shown that finely divided wood treated with half its weight of concentrated sulphuric acid can be made to yield 43–44 per cent. (based on dry weight of the wood) of reducing sugar at a concentration of about 10 per cent. After fermentation a yield of about 19 l. of 100-per-cent. alcohol was obtained per 100 kg. of dry wood. Sulphite pulp that had been subjected to a long cooking period, treated with 1·3 times its weight of sulphuric acid, and subsequently fermented, yielded 48–49 l. of 100-per-cent. alcohol per 100 kg. of dry pulp. Peat has also been tried as a raw material but the alcohol yield is not only much lower than from wood or pulp, but is also variable with the kind of peat used. Brief notices are also included on the

influence of chip size in sulphite cooking, the influence of steaming and vacuum treatment in the sulphate process, and on sulphur-lignin and its significance in the sulphate process.

33.4. *Converted Structural Timber*

33.4 : 12.25 : 33.91. **Heavy duty flooring and roofing plank of Southern Pine.** Southern Pine Association, New Orleans, Louisiana. [1941?] pp. 8. P.R.

A popular trade informational pamphlet.

33.4 : 76.1 : 32 : 33.17 : 22.14.2 : 12.25. JENSEN, V. S., BEHRE, C. E., and BENSON, A. O. **Cost of producing White Pine lumber in New England.** *Circ. U.S. Dep. Agric.* No. 557, 1940. pp. 40. [Northeastern Forest Exp. Sta.]

A study was made of six representative operations in New England and the following conclusions are noted and discussed in detail: (1) Log size is the most important factor determining cost of lumber production, lumber grade, margin of profit and stumpage price, large timber being most profitable. (2) Method of cutting has little effect on operating costs in accessible stands. (3) Desirable silvicultural conditions are generally maintained by partial cutting. (4) Timber values are greatly increased by pruning. (5) Greater values are obtained in manufacture of square-edged rather than round-edged lumber. (6) Graded lumber values exceed mill-run prices. (7) Utilization and disposal of mill waste merit consideration. (8) Inadequacy of power reduces margin of profit.

33.6. *Packing Boxes, Crates, etc.*

33.6 : 12.26–8 : 43.3 : 98.1 (945). **Timber supply for case manufacture in Victoria.** *Aust. Timb. J.* 7, 1941 (169, 195).

Experiments have shown that the light weight and colour, the strength and easy working of the timber of immature, fire-killed Mountain Ash and Alpine Ash (*Eucalyptus* spp.) make it a most suitable material for case and butter-box manufacture, and extensive operations have been undertaken to make supplies available to replace the large quantities of case timber previously imported.

33.6 : 31.0 : 12.25. CANADA. **Report of the Lands, Parks and Forests Branch for the fiscal year ended March 31, 1940.** *Repr.* from the Annual Report of the Department of Mines and Resources, pp. 60–135. King's Printer, Ottawa, 1941.

The woods of Sitka Spruce, Western Hemlock (*Tsuga heterophylla*), Grand Fir and Amabilis Fir have all been found to be satisfactory for use in butter boxes (p. 129).

33.6 : 34.6. ELLIS, M. H. **Slabs and offcuts.** *Wood* 6, 1941 (175–6).

These should now be utilized to a greater extent in the manufacture of boxes and other small wooden articles. Organization to permit prompt conversion to dimensions certain of use is necessary in order that slabs and offcuts may become a calculable part of British timber resources. Size specifications based on known constant needs are included.

33.8. *Other Manufactured Products*

33.8 : 31.0. **Timber for oars.** *Mon. News Lett. Div. For. Prod. Aust.* No. 111, 1941 (1–2).

The Australian timbers Silver Quandong (*Elaeocarpus grandis*), Bollywood (*Litsea reticulata*), Bunya Pine (*Araucaria bidwillii*) and Hoop Pine (*A. cunninghamii*) have been found to be satisfactory for spoon-blade oars, while species that compare favourably with White Ash (*Fraxinus americana*) for straight oars include Alpine Ash (*Eucalyptus gigantea*) Rose Gum (*E. grandis*), Silver Quandong, Silver Ash (*Flindersia pubescens, F. bourjotiana* and *F. schottiana*), Hoop Pine, Yellowwood (*Flindersia oxleyana*), Tulip Oak (*Tarrietia* sp.) and Broadleaved Teatree (*Melaleuca leucadendron*).

33.8 : 31.0 : 12.26–8. **Timbers for handles.** *Aust. Timb. J.* 7, 1941 (78).

Tests made by the Division of Wood Technology, Forestry Commission, N.S.W., indicate that Spotted Gum (*Eucalyptus maculata*) can make handles that are equally as good as those of American Hickory (*Hicoria* spp.), provided the wood is carefully selected. Mechanical tests or microscopic examination of handle blanks, the use of wide planks and the application of an Izod test to each corner of the plank with a minimum Izod value of 14 lb. as a standard, are recommended as the basis for selection of suitable material.

33.9. *Grading and Storage of Converted Timber*

33.91 : 12.25 : 31.27. **Grading softwoods for strength.** *Wood* 6, 1941 (196–8).

Explanation of the method of relating visible defects and other characteristics of beams to strength by means of grading rules which define the limiting sizes of defects and will assure the user of a definite safe working strength for a given beam when placed in a structure. So far grading rules have been formulated for three 'stress grades' of softwoods, mainly British-grown, that are suitable for small beams such as joists and rafters.

33.91 : 12.25 (71). **Official grading rules for White Pine, botanical name *Pinus strobus*, and Red or Norway Pine (*Pinus resinosa*).** White Pine Bureau, Toronto. 6th ed., 1940. pp. 32.

33.91 : 12.25 (73). **Standard specifications for grades of California Redwood lumber.** Adopted 15th July, 1936, by the California Redwood Association. Revised ed., May, 1940. pp. 72. P.R.

33.91 : 12.25 : 31.0 : 98. DIXON, L. B. **Pacific Coast Hemlock and domestic markets.** *B.C. Lumberm.* 25 (7), 1941 (24–6). [B.C. Lumber and Shingle Manufacturers' Association.]

It is pointed out that Western Hemlock (*Tsuga heterophylla*) bears little resemblance to Eastern Hemlock (*T. canadensis*) either as a tree or as lumber. The valuable properties and uses of *T. heterophylla* are emphasized and compared with the less desirable qualities and restricted uses of the eastern species. Grade selection of Western Hemlock is discussed in relation to certain requirements, and the relative value of Douglas Fir for some purposes is indicated.

33.91 : 33.15 : 12.25. **Douglas Fir plywood (domestic grades).** *Commercial Standard* CS45–40. U.S. National Bureau of Standards. Washington, D.C. 4th ed., 1940. pp. 24.

33.91 : 33.53 (410). **Specification for home grown telegraph poles (relaxed to meet wartime conditions 1940/41).** Post Office Stores Department. 1940. pp. 2. P.R.

33.92 : 07.7. **New yard sticking method.** *W. Cst. Lumberm.* 68 (6), 1941 (56, 58).

The lumber is piled in units of about 1,633 bd. ft. on supports or 'bearings' about 1 ft. above the ground, twenty-four units being piled on each bearing. The lumber is prevented from shifting by fastening cross pieces together from one pile to the next.

34. MINOR FOREST PRODUCTS AND THEIR UTILIZATION

34.2. *Vegetable Products*

34.24. Tanning Materials. Cork

34.24 (729.2). SWABEY, C. **Supply of tanning materials in Jamaica.** *Carib. For.* 2, 1941 (145–6): *extr.* from *J. Jamaica agric. Soc.* June–July, 1939.

There is scope for production of better tanning materials within the Island. The growing of *Acacia mollissima* and *A. decurrens* is one of the measures recommended.

34.24 : 12.25 : 32.24 : 32.25.5. FABRICIUS, L. Forstliche Versuche XXIV. Gewinnung der Fichtengerbrinde von Stämmen, die im Winter gefällt sind. **[Forestry experiments. XXIV. Harvesting of Spruce tanbark from trees felled in winter.]** *Forstwiss. Cbl.* 62, 1940 (189–97). [G.] Biol. Abs. 15 (13420).

The bark of Spruce does not peel readily in winter, when much of the felling for timber is done, but if logs are left unpeeled in the woods it can be removed later in the year. During experiments on the best time for peeling and the relation between ease of peeling and felling season it was found that practically all logs cut after mid-December could be peeled by the following mid-June. The bark became loose at the same time that buds opened on living Spruce and Beech, and remained so for about eight weeks. Logs stored in the shade peeled better than those exposed to sun. The tannin content of the bark is somewhat higher in winter.

34.24 : 12.25 : 32.24. BOURQUIN, A. La récolte des écorces à tan dans les coupes d'hiver. **[The harvesting of tanbarks during winter fellings.]** *J. for. suisse* 92, 1941 (73–80). [F.f.]

Investigations in Germany by Fabricius and others and the author's own observations in Switzerland indicate that it is not advisable to harvest the tanbark of winter-felled Spruce in spring. The produce obtained is not sufficiently uniform in quality and the barking involves much more labour than in the case of trees felled in summer.

34.24 : 12.26–8 : 12.11.21 : 23 : 24. METCALF, W., and WALTZ, R. S. **Experiments with Cork Oak in California.** Agricultural Extension Service, University of California, Berkeley. 1941. pp. 5.

Report on preliminary planting and cork-stripping experiments with *Quercus suber*. This species was first introduced in California about 1858 and has been planted extensively as an ornamental.

34.24 : 12.26–8 : 12.11.21 : 23 : 24. **The propagation and care of Cork Oaks (*Quercus suber*).** Agricultural Extension Service, University of California, Berkeley. 1941. p. 1.

34.25. Ornamental Trees. Medicinal and Edible Plants

34.25 (78.6). RAPRAEGER, E. F. **Christmas tree production in western Montana in 1940.** *Res. Note Nth. Rocky Mt. For. & Range Exp. Sta.* No. 12, 1941. pp. 2.

The 1940 production is estimated at 2,338,350 trees, nearly all of which were Douglas Fir. Statistics are given for shipments by counties.

34.25 : 12.26–8 : 12.11.11. MARAÑON, J., and GONZALES, C. **On the chemical constituents of *Cinchona*.** *Philipp. J. For.* 3, 1940 (309–23). [Bureau of Science, Philippines.]

34.26. Resin. Turpentine. Oils. Sugar

34.26 : 12.25 : 12.11.11. MALEVSKAYA, S. S. **Resin acids of coniferous trees. IV. The structure of *l*-pimaric acid.** *J. appl. Chem. (U.S.S.R.)* 13, 1940 (1085–97). [R.f.] Chem. Abs. 35 (2149). P.R.

34.26 : 12.25. FIJI. **Forest Department. (Annual report for 1940.)** Legislative Council. *Council Paper*, No. 3, 1941. pp. 4.

As it has been found impossible to devise a method of tapping Kauri (*Agathis vitiensis*) for an economic yield of gum without endangering the life of the tree, the export of Kauri gum has been prohibited (p. 3).

34.26 : 12.25. LIEFELD, T. A. **Increased naval stores production from chemically treated streaks.** *Occ. Pap. Sth. For. Exp. Sta.* No. 97, 1940. pp. 6.

Six reagents, including 5- and 20-per-cent. solutions of sulphuric acid, acetic acid and washing soda, were applied to ¼-, ⅝- and 1-in. streaks of Slash and Longleaf Pine. The highest increase in resin yield was brought about by the 20-per-cent. sulphuric acid treatment, which, when applied to ⅝-in. streaks of Slash Pine increased the yield by 67 per cent., although for Longleaf Pine it was necessary to apply the treatment to a 1-in. streak in order to maintain a 27-per-cent. increase in yield.

34.26 : 12.25. HALL, L. C. (to Hercules Powder Co.). **Resin from Pine wood.** *U.S. Patent* No. 2,221,540, 12th November, 1940. Chem. Abs. 35 (1652). P.R.

Specification of extraction processes for obtaining from Pine wood a resin that is soluble in alcohol but substantially insoluble in light petroleum hydrocarbons.

34.26 : 12.25 (56.43). ***Pinus halepensis* oleo-resin from Cyprus—II.** *Bull. Imp. Inst., Lond.* 39, 1941 (104–6).

Two samples of *Pinus halepensis* oleo-resin from Cyprus were found to resemble a previous sample in composition [cf. *Bull. Imp. Inst., Lond.* 36, 1938 (157)], yielding a laevo-rotatory oil of turpentine that consisted chiefly of α-pinene, the main constituent of commercial American oil of turpentine, and a rosin or colophony similar in character to the American product. The best sample was one derived from old mature trees; this had the least impurities, gave the palest rosin, and yielded the highest percentage of oil, which had a rather higher pinene content and gave the lowest and most satisfactory evaporation residue.

34.26 : 12.25. STRELE, G. Über die Gewinnung des 'Latschenkieferöles'. **[On the production of 'Latschenkieferöl' ('Mountain Pine oil').** *Cbl. gesamte Forstw.* 67, 1941 (107–17). [G.]

This Alpine industry usually involves the destruction of *Pinus montana* stands of a protective character, and, it is suggested, should be more strictly regulated in future.

34.26 : 12.26–8. RIOU, P., and DELORME, J. **The analytical problem of Maple sap products.** *Canad. J. Res.* 19, Sec. B, 1941 (68–72). [University of Montreal.] P.R.

A systematic study of official methods of analysis of Maple sap products has been made in order to investigate their validity as criteria of the purity of these products. A new value, the manganese number, is being proposed as a safer criterion, but, in some cases, even this may lead to error. The conclusion of the writers is that, at the present time, it cannot be stated with certainty that a Maple product is 100 per cent. pure; it is therefore necessary that research work be continued in order to find a criterion of purity that would be valid in every case. *Authors' summary.*

34.26 : 12.26–8 (67.7). **Incense gums from British Somaliland.** *Bull. Imp. Inst., Lond.* 39, 1941 (99–104).

Analyses of various grades of Mohor (*Boswellia carteri*) gum—disregarding one grade that consisted largely of bark and other impurities—showed that they contained 62·2–63·8 per cent. of alcohol-soluble resins, 17·6–21·7 per cent. of water-soluble gum + other water-soluble matter, 6·9–9·4 per cent. of volatile oil, 4·2–4·7 per cent. of water, and 2·0–7·7 per cent. of dirt + insoluble gum. Maidi (*B. frereana*) gum consisted of 85·3–90·5 per cent. of alcohol-soluble resin, 0·7–1·7 per cent. of water-soluble gum + other water-soluble matter, 4·5–10·3 per cent. of volatile oil, 0·7–0·8 per cent. of water, and 1·8–3·6 per cent. of dirt + insoluble gum. Mohor is thus a true gum-resin or gum-oleo-resin, but Maidi must be classed as an oleo-resin of the elemi type. A sample of 'blocked' (conglomerated) gum was similar to Mohor and was evidently derived from *B. carteri*, which furnishes the bulk of the 'gum' exported from British Somaliland. 'Blocking' was shown to be a result of insufficient drying before the material was packed. Two firms to which samples of the gums were sent in April, 1939, gave current market values for the products, but reported that the European market for such material was so restricted that the values could only be considered as nominal ones.

34.26 : 12.26–8 : 12.11.11. PENFOLD, A. R., and MORRISON, F. R. **The essential oils of *Eucalyptus australiana* (Baker and Smith) and its physiological forms. Part III.** *Repr.* from *J. roy. Soc. N.S.W.* 74, 1940 (277–82). [Technological Museum, Sydney.]

Preliminary chemical and physical data are given for the essential oils of forms of *Eucalyptus australiana* from the New England district of New South Wales and from Taggerty, Victoria.

34.26 : 34.25 : 12.11.11. DÁVID, L. A *Pix Betulae, Fagi, Juniperi oxycedri* és a *Pix mineralis* új elkülönítö reactiói. **[New differential reactions for Birch, Beech, *Juniperus oxycedrus*, and mineral pitch.]** *Berichte der Ungarischen Pharmazeutischen Gesellschaft* 16 (1), 1940 (8–10, 87–8). [Hu.g.] L.S.

Colour reactions for distinguishing these pharmaceutical preparations.

34.28. Bamboos

34.28 : 12.29 : 33.3. ASAI, S. **Hardening Bamboo.** *Japanese Patent* No. 131,868, 28th August, 1939. Chem. Abs. 35 (3058). P.R.

Bamboo is treated with Bismarck brown and two other basic brown dyes, boiled, then treated with a boiling solution of $FeSO_4$ or $Fe(OAc)_2$, washed and dried.

34.6. *Utilization of Logging and Milling Waste*

34.6. **Utilization of sawdust.** *Suppl.* to *Mon. News Lett. Div. For. Prod. Aust.* No. 113, 1941. pp. 4.

General notes on the principal uses of sawdust, which are listed as fuel, litter, packing, insulation, stuffing, food preservation, ingredient in compositions, wood meal and wood flour, and as an abrasive or absorbent.

34.6. BOWLING, R. T. (to Wood Briquettes, Inc.). **Fuel briquets.** *U.S. Patent* No. 2,222,250, 19th November, 1940. Chem. Abs. 35 (1969). P.R.

Solid cylindrical briquettes are formed of helically spiral ribbon laminations of compressed vegetable material such as wood or bagasse with corrugations conforming to the lay of the spiral laminations, serving to give resistance to disintegration. [Cf. *For. Abs.* 3 (68).]

34.6. FREY, U. **Improved method for the manufacture from ground wood of material suitable for floors or walls and the improved material.** *British Patent* No. 521,404. Building Sci. Abs. (*n.s.*) 14, 1941 (30). P.R.

A process of paraffining finely ground material such as wood waste and kneading it together in the presence of a casein-glue solution.

34.6. SPRECHER, A. VON. **Building blocks.** *Swiss Patent* No. 203,902, 1st July, 1939 (Cl. 8*b*). Chem. Abs. 35 (3058). P.R.

Wood refuse resulting from the extraction of tannin is intimately mixed with cement and fine grain rock, the mixture is treated with H_2O, formed into the shape of a building block and left to harden. Ground corn cobs, corn stalks, or both can be added to the wood refuse. Marble or other stone dust, or sand, can be used with the cement. The wood refuse is treated with waterglass and then milk of lime to obtain the greatest possible penetration.

34.6 : 07.7. HYLER, J. E. **Wood waste for fuel. Pt. II: Getting the fuel to the furnace.** *Sth. Pwr. Ind.* 58 (12), 1940 (68–70). L.S.

34.6 : 33.06 : 07.7. CANADA. **Report of the Lands, Parks and Forests Branch for the fiscal year ended March 31, 1940.** *Repr.* from the Annual Report of the Department of Mines and Resources, pp. 60–135. King's Printer, Ottawa, 1941.

Experiments have shown that, provided suitable grates are used, a satisfactory fuel is obtained from Pine, Spruce, Sugar Maple or Yellow Birch sawdust, even in 'green' condition, and that when the proper equipment is used, sawdust is as efficient a furnace fuel as cordwood of the same species (p. 129).

38. FOREST CONSTRUCTIONAL WORKS. ENGINEERING

38.2. STERN, E. G. **A study of lumber and plywood joints with metal split-ring connectors.** *Bull. Pa. St. Coll. Engng. Exp. Sta.* No. 53, 1940. Accession list, library of the Lands, Parks and Forests Branch, Department of Mines and Resources, Ottawa, March, 1941.

38.2. **Timber connectors.** *Wood* 6, 1941 (134–8).

Describes the use of various types of metal connectors in structural woodwork.

38.2 (485). ZIETZSCHMANN, E., and TAESLER, W. Holzhausbau in Schweden. **[Wooden house construction in Sweden.]** *Schweiz. Z. Forstw.* 92, 1941 (57–67). [G.]

38.2 : 82. TERNSTEDT, B. Flyttbar bostad vid skogskolning. 'Holmsunds' kolarkoja för 3 man. **[Portable housing for charcoal burning in the forest. The 'Holmsund' charcoal burners' cabin for 3 men.]** *Skogen* 28, 1941 (94–5). [Sw.] L.S.

Illustration and design of a simply constructed portable wooden cabin housing three men.

38.3 : 72. SÖDERSTRÖM, E. Skogsbilvägarna i förgrunden. **[Forest motor roads in the foreground.]** *Skogen* 28, 1941 (96–8). [Sw.] L.S.

Reproduction of part of a lecture discussing the economic factors to be considered when laying out new forest motor roads. These consist of road construction and maintenance costs, the area to be served and its nature, the actual or prospective extent of logging, estimation of possible savings in tranport costs by the presence of roads, and the period of amortisation. Examples based on actual estates are given to illustrate the details of costing.

4. FOREST INJURIES AND PROTECTION

42. INJURIES FROM INORGANIC AGENCIES, EXCLUDING FIRE

42.1. *Air Currents*

42.1. JENSEN, V. S. **Hurricane damage on the Bartlett Experimental Forest.** *Tech. Note Ntheast. For. Exp. Sta.* No. 42, 1941. pp. 2.

Topographic features affected windthrow both in regard to exposure and in influencing run-off and soil moisture. Trees with little or no foliage sustained relatively slight losses. Heavier losses occurred in uneven-aged than in even-aged stands. Windthrow varied with species, heavy losses being recorded for Red Maple, Paper Birch and White Ash, which have rapid height growth and are consequently more exposed than the slower-growing species. Large trees, particularly tall slim trees with short dense crowns, showed greater damage than smaller trees. Heavy losses occurred in stands from which part of the trees had been cut and in stands on the windward or leeward sides of clear-cut areas.

42.2. *Temperature Influences*

42.21. WRIGHT, E. **Freezing injury to trees and nursery stock in Nebraska and Kansas during November, 1940.** *Plant Dis. Reptr.* 25, 1941 (56–60). [Bureau of Plant Industry, U.S.D.A.] L.S.

A severe early frost was experienced in Nebraska, Kansas, and the mid-western portion of the United States over the period, 11–15th November, 1940. Preliminary indications of damage to trees, shrubs, and nursery stock are recorded in notes and tables giving the probable extent of injury to individual species. Chinese Elm (*Ulmus pumila*), which has been extensively used for shelterbelt and ornamental plantings, seems to be among the worst sufferers from frost injury.

42.21 : 12.25 : 11.47.13 : 23.26.4. KOPITKE, J. C. **The effect of potash salts upon the hardening of coniferous seedlings.** *J. For.* 39, 1941 (555–8). [U.S. Forest Service.]

The effect of potash fertilization upon the properties related to hardening of White Spruce, Red Spruce, and White Pine seedlings was studied in quartz sand cultures and on sandy nursery soils located in northern Wisconsin. Application of potash fertilizers promoted the accumulation of simple and invert sugars in the tissue of seedlings. It increased the content of total solids and the osmotic pressure, and lowered the freezing point of the expressed sap. All of these changes indicate a marked improvement in the ability of nursery or planting stock to withstand frost injury. Frequent analyses of nursery soils and timely correction of potash deficiency are recommended as a prerequisite for production of frost-resistant nursery stock. Applications of fertilizer in amounts higher than 300 lb. of K_2O per acre had a pronounced unfavourable effect. *Author's summary.*

42.21 : 12.26–8 : 12.11.3. GRAUMANN. Frostschäden an ostpreussischen Eichen. [**Frost damage to East Prussian Oaks.**] *Dtsch. Forstw.* 22, 1940 (580–1). [G.] Biol. Abs. 15 (13424).

Frost damage to small 40- to 50-year-old plantations of *Quercus pedunculata* in East Prussia during the severe winter of 1939–40 was much less marked in stands raised from East Prussian seed than in those from seed from other sources.

42.21 : 12.26–8. COOPER, W. E. **Frost heaving and damage to Black Locust seedlings.** *Ecology* 21, 1940 (501–4). [Soil Conservation Service.]

Frost heaving of Black Locust seedlings in northern Alabama during the extremely severe winter of 1935–6 may be taken to represent the maximum for any of the Southern States. A study of the percentage of seedlings heaved and the degree of heaving, on 5 sites combining different ground-cover and erosion conditions, showed that the protection afforded to seedlings varied in direct proportion to the ground cover. Seedlings planted on stabilized sites with sufficient vegetation and those in barren gullies that were properly mulched were almost equally protected, whereas those in severely eroded gullies or inadequately mulched sites were almost equally damaged. Comparisons of seedlings on sheet-eroded areas showed that frost heaving affected small plants most severely, the percentage of heaving being about 50 for plants 6–12 in. high, 46 for plants 12–18 in. high, and 33 for plants 18–24 in. high. There was little difference in the percentage of heaving for stock planted in the fall or early winter and that planted in spring, thus frost heaving was not cumulative and it also appeared that after two weeks the plants became stabilized, either by root growth, soil settling, or a combination of both. Based on the number of seedlings lifted almost or completely out of the ground, the resulting mortality should not exceed 5 per cent. of the stand, and any retardation of growth in the remaining seedlings should be temporary, lasting only until a complete root system has been re-established.

42.22 : 12.26–8. PAŞCOVSCHI, S. Uscarea frunzelor din cauza secetei. [**Drying-out of leaves as a result of drought.**] *Rev. Pădurilor* 53, 1941 (82–4). [Rum.g.]

In the Rumanian plain the Pear tree regularly sheds its leaves in the late summer. Similarly, *Acer tataricum*, *Prunus nana*, *P. fruticosa*, and *Crataegus monogyna* were observed to shed theirs during the 1928 drought in Bessarabia.

42.3. *Precipitations*

42.32 : 12.25 : 31.27 : 33.51. **Utilization of timber damaged by the ice-storm of January, 1940.** *Quart. J. For.* 35, 1941 (120–3).

This storm caused the crowns of trees to become thickly coated with ice, with the result that they were bent, bowed down, or broken. Tests by the Forest Products Research Laboratory on pitprops cut from such trees indicate that the strength of the timber is in general not seriously affected. Pending further investigation, props should not be cut from badly bowed timber and caution should be observed in utilizing sawn timber from damaged stands for structural work.

42.5. *Chemical Influences. Nutrient Deficiencies*

42.5 : 11.47.13. MIDGLEY, A. R., and DUNKLEE, D. E. **The cause and nature of overliming injury.** *Bull. Vt. agric. Exp. Sta.* No. 460, 1940. pp. 22.

The cause of overliming injury appears to be the chemical fixation of large amounts of borate,

which thus become unavailable to the plants. Boron was the only single element, of the many tried, that was effective in improving over-limed soils and the corrective action of other materials appears to be due to their borate content.

42.5 : 12.25 : 11.42.1 : 21.32. NĚMEC, A. Biochemická studie k otázce odumírání jedle na Křivoklátsku. [**Biochemical investigation of the death of Silver Fir in the Purglitz forests of Bohemia.**] *Lesnická Práce* 19, 1940 (325–52). [Cz.] Biol. Abs. 15 (13441).

The soil beneath a dying stand of *Abies alba* was highly acid and Ca-deficient; it had an adequate supply of readily soluble P_2O_5, fair amounts of soluble Mn and Al compounds in the top 40 cm., but insufficient available K_2O in the 10–50 cm. layer. The Fir needles had much less K_2O, but more Ca, Mn, and SiO_2 than those of normal trees. The sickness and death of the trees is apparently connected with deficiency in K_2O.

42.5 : 12.25 : 21.32. HOBBS, C. H. **Symptoms of mineral deficiency in Pine.** *Abstr.* in *Amer. J. Bot.* 27, 10, 1940 (16s). [Purdue University, Lafayette, Ind.] O.B.D.

Pinus rigida and *P. resinosa* were grown from seed in sand cultures supplied with complete nutrients or lacking N, P, K, or Mg. Deficiency symptoms for each of the first three elements appeared within five weeks from emergence, but symptoms of Mg deficiency did not appear until three months had elapsed. Efforts were also made to secure seedlings deficient in Fe, B, and Mn, but no symptoms developed during the experimental period of six months.

42.51 : 12.26–8. MAY, C., WALTER, J. M., and MOOK, P. V. **Rosy canker of London Plane associated with illuminating-gas injury.** *Phytopathology* 31, 1941 (349–51). [Bureau of Plant Industry, U.S.D.A.]

'Rosy canker' has been found on London Plane at various places in New York and New Jersey, and in 7 out of 8 of the localities it has been established that illuminating gas had escaped into the soil near the affected trees. The cankers have furrowed, hypertrophied, more or less decorticated centres composed of rosy to brown proliferated tissue. Platings from the affected parts have regularly proved sterile.

43. FOREST FIRES

43.0. *Predisposing Factors and Causes*

43.02. MATTHEWS, D. N. **Effect of shape, density, and methods of exposure of fuel moisture indicator sticks.** *For. Res. Note Pacif. Nthwest. For. & Range Exp. Sta.* No. 30, 1940 (1–4).

It is concluded that: (1) There is no apparent difference of any importance between round and square sticks of the same cross section. (2) There appears to be a small but important difference between sticks made from high-density wood and sticks made from low-density wood. (3) There is an important difference in behaviour between flat sticks and round and square sticks of the same cross section and they should not be interchanged. (4) There is no important difference between sticks cut to weight and sticks cut to length, provided that the densest and lightest wood is eliminated in both cases. (5) Screening does not appear to affect appreciably the daily minimum moisture content of the sticks. *From author's summary.*

43.02. MORRIS, W. G. **Effect of ground surface and height of exposure upon fuel moisture indicator stick values.** *For. Res. Note Pacif. Nthwest. For. & Range Exp. Sta.* No. 30, 1940 (5–6).

Tests indicate that the type of ground cover over which sticks are exposed does not affect their moisture content when the ground surface in question is of the order of $3\frac{1}{2} \times 7$ ft. in size, and that when the standard height above the ground at which the sticks are supported is 6 in. they should be adjusted accurately, while at 12 in. a variation of 3 in. in height will probably make no significant difference.

43.02 : 61.32. LEE, H. C. **Aerial photography, a method for fuel type mapping.** *J. For.* 39, 1941 (531–3). [U.S. Forest Service.]

Aerial photographs are used as a basis for locating and classifying fuel types, supplemented by field surveys to determine fuel-type ratings, factors affecting the development of crown fires, and special hazard conditions, and to gain a first-hand knowledge of the country. Steps to be taken for elaborating this method of survey, with the object of obtaining more detailed information, are noted.

43.03 : 33.38.2. WESTMAN, R. Gengasbilarna och skogsbrandfaran. **[Producer-gas vehicles and forest fire danger.]** *Skogsägaren* 17, 1941 (55–7). [Sw.]

Forest fires may be started if heaps of embers are left unquenched when producers are cleaned out by the roadside, and a campaign is needed to bring home this danger to the public. Proper cleaning points should be made at intervals of not more than 5 km.; these should be cleared of all combustible material within a radius of 10 m., should preferably be covered with gravel, and should be within easy reach of water. Vehicles should carry a sheet-metal container for use in emergencies when the producer cannot be cleaned out at one of the proper places.

43.1. *Protective Measures*

43.1. OSSOWSKI, L. **Forest fires.** *Quart. J. For.* 35, 1941 (104–12).

A brief general discussion on precautionary and suppression measures to be taken in fire control.

43.1 : 07.7. ORR, S. W. **A rust-preventive treatment for field cache tools.** *Fire Control Notes* 5, 1941 (121–2). [Routt National Forest.]

The treatment recommended consists in coating the metal parts of fire tools with ordinary commercial paraffin.

43.1 : 81 : 07.7. SIMSON, A. G. **Radio on the fire-line.** *Amer. Forests* 47, 1941 (327–9).

Note on the use of radio in the fire-control work of the U.S. Forest Service.

43.1 : 81 : 07,7. STATE OF NEW YORK. **Conservation Department. Thirtieth annual report, for the year 1940.** *State of New York Legislative Document* (1941) No. 38. pp. 402.

The use of radio-telephone and aeroplane have greatly increased the efficiency of forest-fire control work making it possible to transfer equipment rapidly and accurately to where it can be used most effectively (p. 91).

43.12 : 07.7. Skogsbrandskyddets bevaknings-system. **[Detection system of the forest fire-control service.]** *Skogen* 28, 1941 (85–7). [Sw.] L.S.

An illustrated description is given of a simple instrument for taking bearings from lookout points, consisting of a graduated disc with a simple rotating sight. Zero on the disc is aligned to true north. Corresponding graduated scales are drawn on the headquarters fire map around each lookout point, and a string is fastened to the centre of each so that the intersection of bearings can be located at once.

43.13 : 07.7. **Solid CO_2 pumps water. The Connecticut dry ice pressure unit.** *Pulp Paper Mag. Can.* 42, 1941 (375).

Based on the fact that dry ice has an expansion of 450 to 1 and that when confined it immediately starts to build up a pressure, a 933-lb. pressure can be obtained at 70° temperature using a 25-lb. capacity converter. By means of a control valve this can be reduced to a 100-lb. pressure which when applied to a water tank will cause it to be discharged.

43.13 : 07.7. BRITISH COLUMBIA. **Report of the Forest Branch for the year ended December 31, 1940.** King's Printer, Victoria, B.C. 1941. pp. 101.

A portable one-man pump unit, containing engine, pump, hose, fuel, and tools, which is fitted on a single pack-board and can be packed and operated effectively by one man, has been developed experimentally (p. F46).

43.13 : 07.7. WALTERS, C. S. **A jig for packing linen fire hose.** *J. For.* 39, 1941 (570–1). [Illinois Agricultural Exp. Sta.]

The jig consists of a wooden box of suitable dimensions from which one side has been removed and in which linen fire hose is packed as a bundle preliminary to placing it in a pack-sack.

43.13 : 07.7. MORRISS, D. J. **Florida's one-man fire 'crew'.** *Fire Control Notes* 5, 1941 (79–80). [Osceola National Forest.]

Description of the Mathis fire-suppression plough, which embodies a back-firing attachment. The plough cuts a line 2 in. deep by 4 ft. wide. The attachment consists of a small high-pressure tank and pressure gauge mounted on the rear cross member of the plough. In operation the tank is partly filled with gasolene and air is added at 100-lb. pressure through a built-in valve. The air/gasolene mixture may be released through a small orifice on either side of the plough, and when ignited produces a flame 3 to 6 ft. in length. On several trials one man drove this plough and by himself controlled a small fire.

43.13 : 81. HANSON, E. A. **Man-hours of work required to construct varying lengths of line under different resistance-to-control classes.** *Fire Control Notes* 5, 1941 (84–8). [Region 4, U.S. Forest Service.]

Decisions as to manpower needed to suppress a particular fire before a certain time has elapsed involve estimates of rate and direction of spread to be correlated with estimates of rate of line construction by the men available within the same period of time. The author presents regional tables for checking the results of such estimates by working backwards from the probable acreage the fire will attain.

43.13 : 81. BROWN, A. A. **Guides to the judgment in estimating the size of a fire-suppression job.** *Fire Control Notes* 5, 1941 (89–92). [Region 2, U.S. Forest Service.]

An estimate of perimeter of line which must be worked is basic to determinations of the manpower needed to control a fire. The author develops a rule of thumb for determining perimeter from the length, rather than the area, of a fire.

43.13 : 81. WARD, W. W. **Training and placing cooperators on lightning fires.** *Fire Control Notes* 5, 1941 (93–4). [Malheur National Forest.]

A system is described whereby small crews of voluntary co-operators are trained 'on the job' in suppressing small lightning fires.

43.3. *Fire Damage*

43.3 : 12.14.8. STICKEL, P. W. **On the relation between bark character and resistance to fire.** *Tech. Note Ntheast. For. Exp. Sta.* No. 39, 1941. pp. 2.

Measurements of heat transmission through bark indicated that for comparable thicknesses the bark of Beech gives less protection than that of Balsam Fir, and that Hemlock, with a large proportion of dead outer bark, is much more fire-resistant than is Balsam Fir.

43.3 : 74. JEMISON, G. M., and KEETCH, J. J. **A method for appraising forest-fire damage in southern Appalachian Mountain types.** *Fire Control Notes* 5, 1941 (101–5). [Appalachian Forest Exp. Sta.]

By this method three sources are used for evaluating damage, namely, mortality, decay following butt wounding, and damage associated with slower growth rates of wounded trees of some species. [Cf. *For. Abs.* 3 (74).]

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

44.1. *Forest Weeds*

44.1 : 12.26–8. FAIRBAIRN, W. A. **Kashin Yawo, *Acanthospermum hispidum* DC.** *Niger. For.* 1 (2), 1940 (34–6).

Interim results from a series of experiments undertaken to determine the best method of eradicating this weed indicate that cutting and burning is the most effective treatment.

44.1 : 12.26–8 (94). DODD, A. P. **The biological campaign against Prickly-Pear.** Commonwealth Prickly Pear Board, Brisbane, Queensland. 1940. pp. 177 + map.

44.3. *Fungi*

44.3 : 12.25 : 12.21. MAYOR, E. Notes mycologiques X. **[Mycological notes X.]** *Repr.* from *Bull. Soc. neuchâtel Sci. nat.* 64, 1939. pp. 19. [F.] R.A.M. 20 (235).

Inoculation experiments with aecidia of *Coleosporium petasitis* from needles of *Pinus montana* on *Petasites albus* resulted in profuse development of uredospores on this host. The aecidial stage of *Milesia* (*Milesina*) *vogesiaca* was detected on *Abies alba* needles in 1937 and its genetic relation with the uredo phase of the same fungus on *Dryopteris aculeata* was experimentally confirmed.

44.3 : 12.25 : 12.21. **What's new in farm science. Part 2: Annual report of the Director, Agricultural Experiment Station, University of Wisconsin, Madison.** *Bull. Wis. agric. Exp. Sta.* No. 449, 1940. pp. 96.

Studies have shown that Scots and Austrian Pines are highly susceptible to a fungus disease known as twig blight, while White and Red Pine and White Spruce are fairly resistant (p. 22).

44.3 : 12.25 : 12.21. UNITED STATES. **Twentieth annual report of the Southern Forest Experiment Station, January 1, 1940–December 31, 1940.** New Orleans, La. [1941]. pp. 39.

Of a number of spray combinations tested for the control of fusiforme rust (*Cronartium fusiforme*), the most effective was found to be 8–8–100 bordeaux with one pint of Santomerse S, which reduced infection from 13 to 1 per cent. (pp. 20–1).

44.3 : 12.25 : 12.21. **Spread of White Pine blister rust during the calendar year 1940.** *Plant Dis. Reptr.* 25, 1941 (52–5). L.S.

New records are given of blister rust on White Pines or on the alternate *Ribes* hosts in the Virginias, Michigan, Minnesota, Iowa,

Wisconsin, and California. The discovery of two infected Sugar Pines (*Pinus lambertiana*) in Shasta County, California, extends the known southern limit of the rust to about 107 miles south of the Oregon border.

44.3 : 12.25 : 12.21 : 12.26-8. CANADA. **Report of the Lands, Parks and Forests Branch for the fiscal year ended March 31, 1940.** *Repr.* from the Annual Report of the Department of Mines and Resources, pp. 60–135. King's Printer, Ottawa, 1941.

From the survey of a sample area of White Pine (*Pinus strobus*) it appears that more trees of this species are infected with the blister rust (*Cronartium ribicola*) in areas contiguous to settlement (10–20 per cent.) than on Crown land (1–2 per cent.) owing possibly to the presence of the domestic black currant in the settled areas (p. 121).

44.3 : 12.25 : 12.21. STATE OF NEW YORK. **Conservation Department. Thirtieth annual report, for the year 1940.** *State of New York Legislative Document* (1941) No. 38. pp. 402.

Evidence suggests that for certain areas the width of the blister-rust protective zone can be reduced without impairing the effectiveness of the control work (p. 105).

44.3 : 12.25 : 12.21 : 12.26–8 : 44.1. UNITED STATES. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1940.** Superintendent of Documents, Washington, D.C., 1940. pp. 128.

New developments and improvements in methods of *Ribes* eradication include: (1) An early- and late-season spray and soil drench of Atlacide at 2·4 lb. per gal. of water with Tergitol No. 7 as a spreader for use with *R. triste*. (2) The addition to Diesel oil of about 20 per cent. by volume of the sulphur dioxide extract obtained from lubricating oil for use on small plants of *R. roezli*. (3) Improved mechanical power methods for dealing with heavy patches of *R. roezli* and the use of horse-drawn *Ribes* ploughs or hooks for open-grown medium-sized bushes of *R. cereum* and *R. roezli*. (4) Dynamite for *R. cereum* bushes having 3,000 ft. or more of live stem. (5) Hand tools designed with a true claw-hammer type of mattock blade (p. 49).

44.3 : 12.25 : 12.21 : 12.26–8. SNELL, W. H. **Two Pine plantings near cultivated red currants in New York.** *J. For.* 39, 1941 (537–41). [New York Conservation Department.]

Analysis of the data from a 16-year-old White Pine plantation, in which 43 per cent. of the trees were infected with blister rust (*Cronartium ribicola*) and which contained some red currants inside the planting and a few wild gooseberries inside and along the edges, and also of data from a second planting within 300 ft. and 900 ft. respectively of red currants and wild gooseberries, indicate that little if any of the Pine infection in the two plantings was transmitted from red currants but probably all originated from sporidia from the wild gooseberries.

44.3 : 12.25 : 12.21 : 12.26–8. DAVIS, K. P., and MOSS, V. D. **Blister rust control in the management of Western White Pine.** *Sta. Pap. Nth. Rocky Mt. For. & Range Exp. Sta.* No. 3, 1940. pp. 34.

Basic facts on the ecology of *Ribes* and Western White Pine as related to the influence of forest management practices on the development of blister rust.

44.3 : 12.25 : 12.21. STRONG, F. C. **Root and butt rot in the pinetum at Michigan State College.** *Quart. Bull. Mich. agric. Exp. Sta.* 23, 1941 (159–63).

In November, 1940, 12 trees of *Pinus strobus* in a 44-year-old plantation at East Lansing were partly or completely blown down by a gale and were found to be badly infected with *Polyporus schweinitzii*. Four of the trees had broken off from 6 in. to 3 ft. above ground level, and in one the heartwood was severely decayed to a height of more than 10 ft. Five trees were uprooted as a result of the rotting and weakening of several main roots by the fungus. Mapping of the affected area showed clearly that the fungus spreads from affected trees to adjacent ones rather than appearing sporadically throughout the stand. Available information suggests that greater care should be taken to select favourable planting sites for White Pine in order to avoid stagnation of growth when the trees reach an age of 20 years or more. Greater care in planting may be advisable, to avoid producing soil-filled pockets in the roots through which root infections can enter. From a silvicultural point of view, thinning or fertilizing to increase vigour should discourage spread to healthy trees, but no economically practicable method is known of eradicating diseased trees and the fungus agent

of disease. From an aesthetic point of view it might be advisable to remove all infected trees and to sterilize the soil with carbon disulphide as for *Armillaria* root rot of *Citrus*.

44.3 : 12.26–8 : 12.21. CAROSELLI, N. E. **Injection—a treatment for the bleeding canker disease of hardwoods.** *Scientific Tree Topics* 1, 1941 (46). [Bartlett Tree Research Laboratories, Stamford, Conn.]

Infected hardwoods were injected with an organic chemical by a method that facilitates the absorption of the liquid by the vascular tissues of the trees. Four weeks after treatment was completed 88·2 per cent. of the infected and treated trees failed to yield the pathogen.

44.3 : 12.26–8 : 12.21. SMITH, C. O. **Olive knot induced on species of the Oleaceae by artificial inoculations.** *Phytopathology* 31, 1941 (361–2). [University of California Citrus Exp. Sta., Riverside.]

Inoculations with *Phytomonas* (*Bacterium*) *savastanoi* produced knots on *Olea europaea*, *O. capensis*, *O. verrucosa*, *O. ferruginea*, *O. laurifolia*, *Forestiera neomexicana*, *Osmanthus americanus*, and *O. aquifolium*. Negative results were given by all the species tested of *Ligustrum* and *Syringa*. *Phillyrea decora* developed abnormal overgrowths, but not typical knots.

44.3 : 12.26–8 : 12.21. BROWN, N. A. **Tumors on Elm and Maple trees.** *Phytopathology* 31, 1941 (541–8). [Bureau of Plant Industry, U.S.D.A.]

Attempts to isolate *Bacterium tumefaciens* from tumours on *Ulmus americana* and various species of *Acer* were unsuccessful, but from both types of tumours species of *Phomopsis*, as yet unidentified, were obtained, and the diseases were reproduced by inoculations. Though neither of the diseases is of a rapidly spreading or dangerous type, the trees may be badly disfigured and eventually killed.

44.3 : 12.26–8 : 12.21. TOOLE, E. R. ***Fusarium* wilt of the Mimosa Tree (*Albizzia julibrissin*).** *Phytopathology* 31, 1941 (599–616). [Bureau of Plant Industry, U.S.D.A.]

Three different types of isolate, designated as the appressed, raised mycelial, and raised sclerotial classes, were recognized during studies of *Fusarium perniciosum* in culture, and soil inoculations showed that such differences were correlated with differences in virulence, the second class being highly virulent, the third moderately so, and the first non-virulent. In water-culture inoculations all classes caused a greater degree of wilting, and this method of inoculation is not recommended for studying the pathogenicity of the fungus. Of species of *Albizzia* tested for susceptibility to the fungus, *A. lebbek* proved more resistant than *A. julibrissin* to a highly virulent strain and was unaffected by a less virulent one; *A. lophantha* was more susceptible to a highly virulent strain, but was apparently resistant to certain other strains pathogenic to *A. julibrissin*; *A. thorelii* appeared to be resistant, but further tests on this species are required. Other Leguminosae tested—including *Robinia pseudo-acacia*, *Gleditsia triacanthos*, *Cercis canadensis*, and *Mimosa pudica*—seem to be resistant. [Cf. also *For. Abs.* 2 (246).]

44.3 : 12.26–8 : 12.21 : 31.42.11. CAMPBELL, W. A., and DAVIDSON, R. W. **Cankers and decay of Yellow Birch associated with *Fomes igniarius* var. *laevigatus*.** *J. For.* 39, 1941 (559–60). [Bureau of Plant Industry, U.S.D.A.]

Fomes igniarius var. *laevigatus* was found to be the cause of a trunk canker and an associated rot commonly found on Yellow Birch in the Adirondacks and also noted in Vermont and Pennsylvania. Brief descriptions are given of the cankers, the development of sporophores of the fungus, and of an inoculation experiment in which 7 of the 16 trees (Yellow and Black Birches) inoculated with the fungus developed decay, which penetrated extensively into the sapwood.

44.3 : 12.26–8 : 12.21. RAY, W. W. **A new host for *Taphrina bacteriosperma*.** *Mycologia* 32, 1940 (752–5). R.A.M.20(237).

Taphrina bacteriosperma is recorded for the first time on *Betula lutea* in Canada, causing blister-like, yellow to yellowish-red lesions on the leaves. The asci and spores of the fungus are described.

44.3 : 12.26–8 : 12.21 (69). WIEHE, P. O. **Division of plant pathology.** *Rep. Dep. Agric. Mauritius 1939*, 1941. pp. 10–4. R.A.M.20(291).

It is reported from the plant disease work in Mauritius in 1939 that wilt of *Calophyllum inophyllum* was caused by a fungus identified as a new species of *Haplographium*. Healthy trees experimentally inoculated developed symptoms of wilt in 6 weeks, and 2 weeks later were all dead. The fungus was re-isolated from the affected wood, and in dead

trees the entire sapwood was found to be completely permeated by hyphae. Positive results were also obtained from inoculations of *Mimusops maxima* and *Eugenia glomerata*, but the progress of infection was slow. Stem rot of *Calophyllum inophyllum*, caused by *Geotrichum candidum*, has so far been observed only in one locality.

44.3 : 12.26–8 : 12.21. WATSON, A. J. **Studies of *Botryosphaeria ribis* on *Cercis* and *Benzoin*.** *Plant Dis. Reptr.* 25, 1941 (29–31). R.A.M.20 (327).

A fungus identified as *Botryosphaeria ribis* var. *chromogena* was found on rough, sunken, blackened cankers on the branches and trunks of *Cercis canadensis* in Maryland, North Carolina, and Virginia. Similar cankers on a single bush of *Benzoin aestivale* in Maryland yielded the same fungus in the pycnidial (*Dothiorella*) stage only. Inoculations of wounds with the fungus have given positive results and it has been re-isolated from the infected tissues.

44.3 : 12.26–8 : 12.21. PIRONE, P. P. **Canker of Red Bud in New Jersey.** *Plant Dis. Reptr.* 25, 1941 (95–7). R.A.M.20 (327).

Die-back of *Cercis canadensis* in New Jersey is characterized by elliptical, sunken cankers, ½–2 in. long, weakening and finally killing the branches. The fungus isolated from diseased tissues may be *Botryosphaeria ribis* var. *chromogena* [see preceding abstract] but has as yet produced no spores in culture. Inoculations of wounded and unwounded leaves, green shoots, and woody stems of *C. canadensis* and *C. chinensis* gave positive results only when made on injured surfaces. So far, the only control measure that can be advised is the removal of infected parts and the disinfection and dressing of the wounds so caused.

44.3 : 12.26–8 : 12.21. THOMPSON, G. E. **Leaf-spot diseases of Poplars caused by *Septoria musiva* and *S. populicola*.** *Phytopathology* 31, 1941 (241–54). [Cornell University, Ithaca, N.Y.]

The leaf-spot of Poplar species caused by *Septoria musiva* Peck is apparently restricted to North America, but is widespread in Canada and the northern United States. The perfect stage of the fungus agent was obtained from wintered leaves of *Populus balsamifera* L. and proved to be a new species of *Mycosphaerella*, for which the name *M. populorum* is proposed. In greenhouse inoculation experiments 26 species of Poplar were susceptible, only *P. alba* L. and *P. epirotica* Dode remaining free from infection.

The perfect stage of *Septoria populicola* Peck, which causes another leaf-spot disease of Poplars in the same geographical region, was found on wintered leaves of *P. tacamahaca* Mill. and is named *Mycosphaerella populicola* sp. nov. In inoculation experiments with this fungus only *P. szechuanica* Schneid., *P. tacamahaca* Mill., and *P. trichocarpa* were susceptible, 21 other species being apparently immune.

Both of the new species are described in full and notes are included on their life history and behaviour in culture.

44.3 : 12.26–8 : 12.21 : 31.42.11. BAILEY, H. E. **Contributions to the biology of *Polyporus rheades* (Pers.) Fries.** *Bull. Torrey bot. Cl.* 68, 1941 (198–201). O.B.D.

Polyporus rheades is common in California and causes a destructive white-piped rot in species of Oak. Notes are given on sporophore formation, sporulation, and spore germination. Analyses of Oak wood at various stages of decay showed a progressive utilization by the fungus of all except the ash constituents of the wood.

44.3 : 12.26–8 : 12.21 : 13.2. GRAY, E. **The Willow wood wasp and watermark disease of Willows.** *Vet. J.* 96, 1940 (370–3). R.A.E. A29 (288).

In view of the fact that *Xiphydria prolongata* Geoffr. has been repeatedly found in and about Willows in Essex, investigations were carried out to determine whether it might be a vector of *Bacterium salicis*, the cause of watermark disease. From sources closely related to this wasp a brown slimy growth appeared which later turned yellow, and small discrete colonies of bacteria were observed. The organism isolated grew more rapidly than *B. salicis*, and the original coloration of the colonies was brown instead of grey; it is therefore considered to be a form closely allied to *B. salicis* and associated with the latter in watermarked wood. There is little doubt that it is transmitted through the egg, and the wasp is apparently a passive carrier.

44.3 : 12.26–8 : 12.21. WELCH, D. S., and COLLINS, D. L. **Dutch Elm disease and its control.** *Cornell Ext. Bull.* No. 437 [1940?]. pp. 19.

A semi-popular bulletin dealing with the history of this disease in Europe, its present status in the United States, the susceptibility of various species and varieties of Elm, cause and symptoms, relation to bark-beetle attack, and control measures, which consist of sanitation and maintenance of vigour in the trees.

44.3 : 12.26–8 : 12.21. MAY, C. **Host-parasite relations of *Ceratostomella ulmi*.** *Rep. Proc. 3rd int. Congr. Microbiol. 1939*, 1940 (530–1). Chem. Abs. 35 (1460). P.R.

When *C. ulmi* spores were inoculated into small, vigorously growing Elms having a high N/C ratio, 93 per cent. of the stems were killed within 6 weeks. Low-N trees developed symptoms slowly, but 76 per cent. of their stems died by the end of one season. Rates of movement of inoculated spores are discussed.

44.3 : 12.26–8 : 12.21. PARKER, K. G., READIO, P. A., TYLER, L. J., and COLLINS, D. L. **Transmission of the Dutch Elm disease pathogen by *Scolytus multistriatus* and the development of infection.** *Phytopathology* 31, 1941(657–63). [Cornell University, Ithaca, N.Y.]

Ceratostomella ulmi was obtained from the outer surfaces of *Scolytus multistriatus* adults in higher percentage than from their intestinal tracts. Likewise, the numbers of colonies in the cultures were much greater. Transmission of the fungus to potted healthy Elm trees by the beetles in their feeding activities was readily obtained. The fungus was reisolated from feeding wounds on uninfected trees as long as 3 years following inoculation. Infection was obtained on trees inoculated during the late spring and early summer. Inoculations made later in the season induced infection less frequently or not at all. There was evidence that the fungus sometimes died in infected trees. Sometimes the infected twig died without the entire tree becoming invaded. *Authors' summary.*

44.3 : 12.26–8 : 12.21 : 33.6. TRUE, R. P. ***Ceratostomella ulmi* isolated from Elm wood of dish crates imported from England.** *Plant Dis. Reptr.* 25, 1941 (55). [Bureau of Plant Industry, U.S.D.A.] L.S.

Elm wood used in crates shipped from England and intercepted in August, 1940 at the Port of New York, yielded *Ceratostomella ulmi* when cultured.

44.3 : 23.26.4 : 23.23.15. **What's new in farm science. Part 2: Annual report of the Director, Agricultural Experiment Station, University of Wisconsin, Madison.** *Bull. Wis. agric. Exp. Sta.* No. 449, 1940. pp. 96.

Materials that have been found to be more effective than sulphuric acid in the control of damping-off include the relatively mild chemicals calomel, applied dry at sowing time at 0·1 gr. per sq. ft., Barbak-C, applied dry at 1–2 grs. per sq. ft., Elgetol Special, applied in 2-per-cent. solution at sowing time, and most effective of all, the combination of dusting the seed with Barbak-C and treating the soil with calomel.

Investigations of damping-off in Wisconsin indicate that: (1) The type of organic fertilizer used had little effect on damping-off. (2) Irrespective of soil type, damping-off tends to be severe under hardwood stands. (3) Seedlings are heavily infected on sandy soils that are cleared, while they are relatively free of infection on similar soils bearing a Pine cover (pp. 22–3).

45. DAMAGE BY ANIMALS

45.1. *Mammals*

45.12 : 13.2 : 23.1. SPENCER, D. A. **The porcupine as a factor in regeneration of hurricane areas.** *Fox For. Notes* No. 29, 1941. p. 1.

The blow-down conditions following the 1938 hurricane favour the presence of the porcupine, as any marked opening of the stand increases shrub and herbaceous growth on which this rodent feeds in the summer. It causes severe damage and mortality to certain species, notably Hemlock and also Sugar Maple, Beech, Yellow Birch and Paper Birch in order of preference, and thus causes a definite change in the character of the mixed hardwood/softwood stand of this region. New methods of control are being investigated.

45.3. *Insects*

45.3. POTTS, S. F., and WHITTEN, R. R. **Further tests with concentrated mixtures for aerial spraying.** *J. econ. Ent.* 33, 1940 (676–81). R.A.E. A29 (256–7).

To determine whether certain concentrated spray mixtures could be successfully applied from the air, and to study the comparative

merits of various spreading agents, adhesives, arsenicals and substitutes for arsenicals when applied in concentrates, 22 mixtures were applied to woodland plots from an autogiro. Fresh foliage from most of the plots was fed to larvae of *Anisota senatoria* S. & A. The degree of control was determined by comparing the amounts of frass passed by larvae feeding on sprayed and on unsprayed foliage. Foliage samples were taken 1–56 days after treatment and in all cases the spray residue was sufficient to kill some of the larvae. The arsenical sprays were more toxic than were the organic sprays after the longer periods of exposure. The toxic principles of derris, derris extract, nicotine sulphate, free nicotine and quebracho-fixed nicotine remained on the foliage in effective quantities after 2–3 weeks. Non-drying oils and spreaders reduced adherence, but drying oils increased it. Mixtures containing a drying oil, such as fish oil, gave a heavy deposit and good adherence after 4 inches of rain. Sufficient adherence for most conditions was given by the addition of 0·2 lb. fish oil per 1 lb. arsenical. Certain spreaders increased the atomization, width of swath, and spreading qualities of the mixtures. They facilitated the mixing of the materials and made possible a considerable reduction in the amount of water required to make a fluid mixture. When a spreader was added, 1½ lb. water per 1 lb. lead arsenate was sufficient for good results.

45.3 (71.4). GOBEIL, A. R. **The classification of forest insect injury.** *Rep. ent. Soc. Ont.* 70, 1939 (88–92). [Department of Lands and Forests, Quebec.] L.S.

A brief account is given of the standard methods employed by the Entomological Service of the Department of Lands and Forests, Quebec, for classifying forest insect injuries.

45.3 : 12.25 : 13.2. OSSOWSKI, L. **The large Pine weevil and methods of defence against it (with special reference to the methods adopted in the State forests of Poland).** *Scot. For. J.* 55, 1941 (24–31).

A brief account is given of the life history of *Hylobius abietis*, the attacks of which are most serious on coniferous trees under seven years old. Control measures described are (i) trap trenches with trap pits; (ii) trap logs; (iii) billet traps; (iv) bark traps; (v) trap trenches or pit traps together with short logs; and (vi) chemical methods. It is urged that several of these methods should be used simultaneously, as no one of them is effective by itself. Fellings should not be made in woods adjoining plantations under seven years of age, and preventive measures should be adopted in old stands two to four years before felling, so as to reduce the weevil population before conditions favourable to breeding occur.

45.3 : 12.25 : 13.2. LAIDLAW, W. B. R. **Note on *Rhizophagus* and other enemies of the Pine bark beetles (*Myelophilus*).** *Scot. For. J.* 55, 1941 (32–7).

Predators observed in association with the bark beetles *Myelophilus minor* and *M. piniperda* are listed. Among these *Rhizophagus* species are commonly prevalent and have been known to destroy colonies of *Myelophilus* completely. The two most frequent species, *R. depressus* and *R. dispar*, are described and the former species is illustrated.

45.3 : 12.25 : 13.2 : 13.15. FRANZ, J. Vogelwelt und Tannentriebwickler (*Cacoecia murinana* Hb.). **[Birds and the Silver Fir tortrix (*Cacoecia murinana* Hb.).]** *Allg. Forst- u. Jagdztg.* 116, 1940 (252–5). [G.] Biol. Abs. 15 (13758).

At least fourteen species of birds eat caterpillars of *C. murinana*, and though outbreaks cannot be controlled by birds it is possible to help maintain the biological balance by providing boxes to encourage their nesting.

45.3 : 12.25 (71). BROWN, A. W. A. **Foliage insects of Spruce in Canada.** *Tech. Bull. Dep. Agric. Can.* No. 31 (*Publ.* 712), 1941. pp. 29. [Dominion Forest Insect Laboratory, Ottawa.]

The insect species feeding on Spruce are listed together with available information on host species, geographical range, and other important characteristics, and a series of simplified keys to the most important species are included. A section of the bulletin deals with the principal predacious groups to be found on Spruce foliage.

45.3 : 12.25 : 13.2. MERKER, E., and KLEIN-KRAUTHEIM, F. Der Riesenbastkäfer an der Sitkafichte. **[The giant bark-beetle (*Dendroctonus micans*) on Sitka Spruce.]** *Allg. Forst- u. Jagdztg.* 116, 1940 (255–61). [G.] Biol. Abs. 15 (13766).

D. micans, a common pest of *Picea abies*, attacked *P. sitchensis* and a few *Pinus sylvestris*, but not *Picea abies*, at the Giessen arboretum.

The base of the tree and the roots at some distance from the trunk were generally attacked.

45.3 : 12.25 : 13.2 : 13.1. SMITH, S. G. **A new form of Spruce sawfly identified by means of its cytology and parthenogenesis.** *Sci. Agric.* 21,1941 (245–305). [McGill University, Montreal.] L.S.

An intensive study of the cytology and bionomics of Canadian and European populations of *Diprion polytomum* has brought to light the existence of two distinct forms, one with facultative parthenogenesis and restricted to Europe, the other with obligatory parthenogenesis and common to Europe and Canada. The differences between these two forms are summarized in the accompanying table. The form with obligatory parthenogenesis is considered worthy of specific rank and will shortly be published as a new species.

cal Society of Washington. *Proc. ent. Soc. Wash.* 42, 1940 (208–10). L.S.

Ips calligraphus is reported by L. A. Hetrick to have killed at least 200 Loblolly and Shortleaf Pines , 10 to 25 years old, at Jarratt, Sussex Co., Virginia. The source of infestation was a wood-processing plant in the neighbourhood where the beetles normally attacked freshly cut wood in the storage yard. The attack on living trees occurred at a time when no such food was available to the beetles. In order to reduce the risk of attack on living trees during the summer of 1941 it was suggested that 50 or 100 cords of freshly cut wood should be placed in the yard in warm weather; processing of this 'trap wood' after 3–4 weeks should then destroy most of the beetles and their broods.

45.3 : 12.25 : 13.2. MCDANIEL, E. I. **Sprays to control the Scotch Pine scale,** ***Toumeyella numismaticum.*** *Quart. Bull. Mich. agric. Exp. Sta.* 23, 1941 (151–2).

Early in 1940 a number of sprays were tested on a large uniform plantation of Jack Pine that was heavily infested with *Toumeyella numismaticum.* The sprays used consisted of 4·6 oz. of dinitro-orthocyclohexyl-phenol or dinitro-cresol per 1 gal. of oil of viscosity (Saybolt 100° F.) varying from 52 to 108, and 8 or 16 oz. of the same compounds plus 12 oz. of lye (94 per cent. NaOH), these quantities in all cases being added to 100 gal. of water. A check spray was made up of 4 gal. of oil (visc. 108) emulsified with $\frac{1}{2}$–$\frac{1}{2}$–100 bordeaux. A power rig giving 600 lb. pressure at the nozzle was used to apply

Forms of *Diprion polytomum* Htg.

	European		*Canadian*
	Parthenogenesis facultative	*Parthenogenesis obligatory*	*Parthenogenesis obligatory*
Chromosome number ♂	6	7?	7
Chromosome number ♀	12	14	14
Morphology—			
♂aedeagus	spatulate	pedate	pedate
♀valvular processes	straight	spiralled	spiralled
♀saw-bands	10	11–12	11–12
Cocoon spinning position	44 per cent. in foliage	0 per cent. in foliage	0 per cent. in foliage (in field)
Diapause	atypical	typical	typical
Distribution	Widespread in Europe	Possibly somewhat restricted	Restricted to east of longitude 81° W.
Frequency	*ca.* 85 per cent.	*ca.* 15 per cent.	100 per cent.
Hypothetical origin	from 7-chromosome prototype by complex chromosomal re-arrangement	from 7-chromosome prototype by simple mutation	from Europe by introduction

45.3 : 12.25 : 13.2. BAIRD, A. B. **Biological control of insect pests in Canada with special reference to the control of the European Spruce sawfly** ***Gilpinia polytoma*** **Htg.** *Rep. ent. Soc. Ont.* 70, 1939 (51–6). [Dominion Parasite Laboratory, Belleville, Ont.] L.S.

Work on the biological control of insect pests in Canada is briefly reviewed with particular reference to the promise shown by *Microplectron fuscipennis* and *Exenterus* sp. as parasites of *Gilpinia* (*Diprion*) *polytoma.* [Cf. *For. Abs.* 2 (29).]

45.3 : 12.25 : 13.2 : 31.43. **Minutes of the 513th regular meeting of the Entomologi-**

the sprays between 10th and 17th April, when the scales were showing signs of life. Sample branches were examined on 15th July, and it was found that all sprays were completely effective, the only live scales being seen on occasional branches missed by the spray. None of the sprays caused injury to the trees, even where they had been weakened by scale attack.

45.3 : 12.25 : 13.2. McKENZIE, H. L. **Injury by Sugar Pine *Matsucoccus* scale resembles that of blister rust.** *J. For.* 39, 1941 (488–9). [Bureau of Entomology & Plant Quarantine, U.S.D.A.]

A new species of scale insect, *Matsucoccus paucicicatrices*, causes a definite weakening in young trees and deformation by killing terminal leaders and branches, occasionally kills trees outright, and may attack mature Pine. Trees growing on poor sites, under overhead canopy, and under conditions of intense competition appear to be particularly susceptible to attack. The insects tend to concentrate at the nodes of branches and a heavy infestation results in a swelling of the tissues, cracking of the bark and flow of resin. Indications of attack are seen in the fading of needles in the spring to a pale green, straw colour and finally a deep sorrel. Early stages of attack are very similar to incipient blister-rust cankers and even in later stages there may be confusion. Besides Sugar Pine (*Pinus lambertiana*) this insect is known to occur on Western White Pine (*P. monticola*) and Limber Pine (*P. flexilis*).

45.3 : 12.25. UNITED STATES. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1940.** Superintendent of Documents, Washington, D.C., 1940. pp. 128.

A hazard-inventory survey has been undertaken in the commercial Ponderosa Pine area in north-eastern California. Hazard ratings were allotted to forest stands and areas with reference to attack by insects, particularly bark beetles, based on the history of recent losses and the present condition of individual trees. The management plans of both the Forest Service and private operators are being modified with reference to the information thus made available (p. 24).

45.3 : 12.25 : 13.2 : 31.42.12 : 24.3. JOHNSON, P. C. **Entomological considerations in utilization of insect-killed Ponderosa Pine.** *J. econ. Ent.* 33, 1940 (773–6). R.A.E. A29 (357–8).

Experimental logging operations were conducted by two lumber companies in northern California during 1935 to salvage timber in trees killed by bark beetles. Nearly 5,000,000 bd. ft. of dead and dying Ponderosa Pine were cut and utilized in neighbouring sawmills. Examination of the boles of infested trees showed a significant correlation between blue stain and the insect species present, and between staining and brood development. Timber rejected owing to blue stain amounted to as much as 50 per cent. in trees containing advanced broods of species of *Dendroctonus* and *Ips* and of *Melanophila californica* Van Dyke. Staining was much more rapid than average in trees attacked by *Ips emarginatus* Lec., and much slower in those attacked by *M. californica*. The infestation declined by 40 per cent. in the year following salvage, probably owing to the removal of a large proportion of the beetle populations and the arrested development and heavy mortality from solar heat of broods remaining in the unsalvaged sections of the trees. The reduction in loss was about the same as that after direct control (felling and barking infested trees and burning the bark) under similar conditions in the neighbourhood. Infestations in untreated areas remained unchanged or increased slightly during the same period. The losses two years after salvage appeared to approach the level of those in untreated areas, but it is believed that better control would have resulted if salvage operations had been confined to the months when control measures are more effective.

45.3 : 12.25 : 13.2. UNITED STATES. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1940.** Superintendent of Documents, Washington, D.C., 1940. pp. 128.

While the Black Hills beetle (*Dendroctonus ponderosae*) is adapted to survive the minimum temperatures of its normal distribution, it has been shown that low temperature is a factor of natural control. Mid-October mortality of larvae taken from the bark of Ponderosa Pine begins at 10° F. and is completed at –1°, while by mid-December, when maximum cold hardiness is reached, mortality begins at about –13° and is completed at –31° F. In winter the larvae that are developing on Lodgepole and Limber Pine survive at air temperatures of 5 to 12 Fahrenheit degrees lower than those on Ponderosa Pine while cold hardiness of larvae

is similar on all three hosts in spring and autumn (pp. 24–5).

45.3 : 12.25 : 13.2. JAHN, E. Die Wirkung der dinitro-o-kresol-haltigen Kontaktgifte 'K4' und 'Effusan' auf die Arthropoden der Kiefernkronen. **[The effect of 'K4' and 'Effusan', contact poisons containing dinitro-o-cresol, upon the arthropods of Pine crowns.]** *Cbl. gesamte Forstw.* 67, 1941 (4–11). [G.] [Institut für Forstentomologie und Forstschutz der Hochschule für Bodenkultur, Vienna.]

Report on an investigation in a Pine area in which 63·7 kg. per ha. of either 'K4' or 'Effusan' had been applied for the control of *Bupalus piniarius* L. On the whole, mass mortality was confined to the harmful insects, although a few useful ones, such as *Prosternon holosericeus* Oliv., were partly destroyed. Plant bugs (*Rhynchota*) and spiders were hardly affected.

45.3 : 12.25 : 13.2 : 13.15. MÜLLER-KÖGLER, E. Eingehen von Kiefernspannerraupen durch Frost? **[Killing of Pine looper caterpillars by frost?]** *Z. Forst- u. Jagdw.* 72, 1940 (246–55). [G.] Biol. Abs. 15 (11434).

Caterpillars of *Bupalus piniarius* are generally supposed to be immune to frost, but in a forest in Mecklenburg about 18 per cent. of the population died about the end of October, 1938, apparently from freezing. Subsequent laboratory experiments showed that exposure for 6 hours at −12° to −18° C. killed 83 per cent., while only 10 per cent. were killed by 3 hours' exposure at −5°. With 3 hours at −5° for 3 successive days 30 per cent. were killed. Those killed by frost in the forest are thought to have been weakened by hunger.

45.3 : 12.25 : 13.2. WAGENKNECHT, E. Untersuchungen über die Schäden des Kiefern-Triebwicklers *Evetria* (*Tortrix*) *buoliana* auf Kiefernkulturen. **[Investigations on injuries by the Pine shoot tortrix *Evetria buoliana* to Pine plantations.]** *Z. Forst- u. Jagdw.* 73, 1941 (37–41). [G.] [Waldbau-Institut der Forstlichen Hochschule Eberswalde.]

In a series of sample plots in young plantations over 40 per cent. of trees recorded as attacked in 1931 showed no sign of the pest in 1937 and their stems were entirely straight. On land thoroughly prepared by full cultivation, fewer trees were attacked in dense than in more open plantations.

45.3 : 12.25 : 13.2. UNITED STATES. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1940.** Superintendent of Documents, Washington, D.C., 1940. pp. 128.

Investigations following a widespread outbreak in western Washington of the Douglas Fir twig weevil (*Cylindrocopturus longulus*), which is usually of minor importance, showed that (1) there was one generation of the insect a year, (2) adults overwinter and lay fertile eggs the second winter, (3) thirteen species of Hymenoptera were parasitic on the weevil, and (4) host resistance, competition among larvae, and parasitism appeared to be the most important factors controlling population (p. 27).

45.3 : 12.25 : 13.2. BUCHANAN, L. L. **Three new species of the *longulus* group of *Cylindrocopturus* (Coleoptera: Curculionidae).** *Proc. ent. Soc. Wash.* 42, 1940 (177–81). R.A.E. A29 (370–1).

Descriptions are given of the adults of both sexes of *Cylindrocopturus furnissi* sp. nov., reared from twigs of *Pseudotsuga taxifolia* in Washington, Oregon and California; *C. deleoni* sp. nov., reared from roots and root collars of *Pinus contorta* in Wyoming and taken on *P. ponderosa* in Idaho and on *P. contorta* var. *latifolia* (*murrayana*) in Montana; and *C. eatoni* sp. nov., reared from twigs of *P. ponderosa* and *P. jeffreyi* in California.

45.3 : 12.26–8 : 13.2. **Insect pests and their control.** *Agric. Gaz. N.S.W.* 51, 1940 (563–8). R.A.E. A29 (335).

A brief description is included of the adult of *Bostrychopsis jesuita* F., the larvae and adults of which bore in various trees, including *Eucalyptus*, *Acacia*, *Grevillea* sp., *Melia azedarach*, *Schinus molle*, and fruit trees. Infestation is not limited to dead or dying trees, since apparently healthy orchard trees are attacked and killed. There is no ready means of control, but heavily infested branches should be cut off and burned and the cut surfaces treated with bluestone paint.

45.3 : 12.26–8 : 13.2. MATHERS, W. G. **The shot hole borer, *Anisandrus pyri* (Peck) in British Columbia (Coleoptera, Scolytidae).** *Canad. Ent.* 72, 1940 (189–90). R.A.E. A29 (328).

Xyleborus dispar F. (*Anisandrus pyri* Peck), which has long been present in eastern Canada and the United States, has become increasingly injurious of recent years in British Columbia.

In addition to common fruit trees it has attacked Japanese ornamental Cherry, Walnut, Plane, Maple, *Acacia*, *Diervilla*, and Willow. Notes are included on its distribution in the Province and on dates of emergence of the adult beetles.

45.3 : 12.26–8 : 13.2 : 13.15. Miao, C. P. **Study of some forest insects of Nanking and its vicinity, Part III: Observations on the gypsy moth (*Porthetria dispar* L.).** *Contr. biol. Lab. Sci. Soc. China*, Zool. Ser., 13, 1939 (57–77). [E.chin.] L.S.

Detailed descriptions are given of all stages in the life history of the moth, accompanied by brief notes on its distribution, food plants, and habits.

45.3 : 12.26–8 : 13.2. Ripley, L. B., and Petty, B. K. **Dusting for froghopper in Wattles.** *Fmg. S. Afr.* 1940. *Repr.* No. 48. pp. 2. R.A.E. A29 (278–9).

Tests of contact insecticides against a Capsid (*Lygidolon laevigatum* Reut.) and a Jassid (*Bythoscopus cedaranus* Naudé), which together with other Jassids of minor importance are responsible for 'froghopper' damage to *Acacia* in South Africa, showed that a proprietary pyrethrum powder was the most effective. Talc was the best diluent tested, and a 1:20 dust of pyrethrum powder and talc gave satisfactory results in laboratory and field tests, though a strength of 1:15 may prove necessary for good field results under some conditions. Applications of 5–20 lb. mixed dust per acre, according to the size of the trees, will probably be necessary; trees over 12 ft. high are unlikely to need treatment. The cost is considered economic. It is emphasized that it is usually too late to dust the trees when the witch's broom type of damage has begun to show. Young plantations should be examined every week or two from November onwards, and dusting should be carried out as soon as the insects become numerous, wherever they are abundant, and preferably before any reach the adult stage. One dusting per season will probably be sufficient.

45.3 : 12.26–8 : 13.2. Wolcott, G. N. **The dispersion of the cottony cushion scale in Puerto Rico in eight years.** *Carib. For.* 2, 1941 (132–5). [E.span.] [Agricultural Exp. Sta., Rio Piedras, Puerto Rico.]

An account of the progressive dispersion, chiefly due to wind, of *Iceria purchasi* since it was first observed in 1931. Trees attacked nclude *Citrus* and *Casuarina equisetifolia*.

45.3 : 12.26–8 : 13.2 : 13.15. Martorell, L. F. **Biological notes on the Sea-grape sawfly, *Schizocera krugii* Cresson, in Puerto Rico.** *Carib. For.* 2, 1941 (141–4). [E.span.] [Agricultural Exp. Sta., Rio Piedras, Puerto Rico.]

Defoliation damage is caused chiefly to trees of the genus *Coccolobis*.

45.3 : 12.26–8 : 13.2. Kelle, A. Ursache der Eichenkropfbildung. **[Cause of the formation of Oak tumours.]** *Bericht über die Verhandlungen des IX. Kongresses des Internationalen Verbandes Forstlicher Forschungsanstalten.* pp. 23. *Abstr.* in *Forstarchiv* 17, 1941 (165–6). [G.]

Oak tumours vary widely in shape and size and are characterized in cross-section by the excentric medulla, the curved course of the wide, numerous and indistinct medullary rays, the narrow-lumened vessels, and the thickened bark. Microscopic examination shows that in both wood and bark tissues parenchymatous elements become abnormally abundant at the expense of conductive and mechanical ones. The tumours begin to form in the first or second annual ring. Previous theories on the cause of the disease are reviewed and the author concludes from personal observations that the tumours are due to attack by the aphid *Lachnus roboris* L. It is suggested that the serious occurrence of the disease is a result of using seed of unsuitable origin. Bad sap conduction is believed to be the primary and aphid damage the secondary cause of the disease.

45.3 : 12.26–8 : 13.2. United States. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1940.** Superintendent of Documents, Washington, D.C., 1940. pp. 128.

Following the elimination of Spanish Cedar from Puerto Rico, the cedro shoot borer (*Hypsipyla grandella*) appears to be increasing rapidly in Mahogany plantations (p. 27).

45.3 : 12.26–8 : 13.2. United States. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1940.** Superintendent of Documents, Washington, D.C., 1940. pp. 128.

In testing the value of various mixtures for killing the immature stages of *Scolytus multistriatus* and *Hylurgopinus rufipes*, excellent results were obtained with emulsified sprays in

which water was used in as a carrier place of fuel oil (p. 25).

45.3 : 12.26–8 : 13.2. FENTON, F. A. **The brown Elm scale: description and control.** *Bull. Okla. agric. Exp. Sta.* No. 245, 1940. pp. 4.

Descriptions are given of the appearance and life history of *Lecanium corni* Bouche, which is widely distributed in the United States and is a common pest of Elm and other hardwoods in Oklahoma. On Elm, heavy infestations kill smaller branches and stunt tree growth, thus rendering the trees liable to borer attack and disease. Good control can be obtained by spraying in March, before the leaf buds begin to open, with a 4–6 per cent. miscible-oil or oil-emulsion spray, which should be applied at the rate of 5–6 gal. per tree on calm days when the temperature is above 40° F. and is unlikely to drop below freezing point within the next 24 hours.

45.3 : 13.1 : 13.2 : 23. COLQUHOUN, M. K. **The birds of Savernake Forest, Wiltshire.** *J. anim. Ecol.* 10, 1941 (25–34).

The extermination of bracken to favour natural regeneration of Oak will reduce the population of ground-nesting birds, and if Hawthorn scrub should also be eliminated other species will suffer. Such changes are likely to be detrimental to the forest, as the density of small birds, many of which prey on insect defoliators, is already low.

45.3 : 13.15 : 13.2. CLAUSEN, C. P. **Entomophagous insects.** McGraw-Hill Book Co., Inc., New York and London. 1940. pp. 688.

This book is designed to serve as a vademecum for all engaged upon the study of insect parasitism, and the many problems of biological control. A vast field has been surveyed, as the majority of the insect orders contain some examples of entomophagous habit. It is, therefore, likely that it will be easier to point out the things which the author has omitted, than to list all those which he has discussed. The book is well illustrated, and the bibliography, which amplifies the textual references, is extensive. The text, which runs to over 600 pages, surveys some 16 orders in all, but the greater part of it is taken up with the two most important orders, the Hymenoptera and Diptera. The former have been particularly closely surveyed, and those portions which deal with the life-history stages and larval morphology of the parasitic groups are well worth close study. In this section of the book, one slight error may be noted, the author states on page 271, in connexion with the parasite, *Ibalia leucospoides* Hochenw., that 'in recent years, it has been colonized and established in New Zealand'. This is an error, it was the parasite *Rhyssa persuasoria* L., which was colonized and established in New Zealand some years since.

The treatment of the order Diptera is almost as complete as that of the Hymenoptera, and a great deal of detail on the morphology and biology of important groups is given. The orders Lepidoptera and Coleoptera follow the Diptera, and are treated in about 100 pages, which leaves only a slight residue of space for the last 12 orders, which include the Hemiptera, Neuroptera, Odonata, Orthoptera, etc. Even here, however, it is surprising how much detail has been included in a few pages. Further, there are timely reminders of gaps in our knowledge, which when filled, can be included in future editions.

The book is costly, but indispensable, and not likely to be superseded for many years to come.

R. N. CHRYSTAL.

45.3 : 13.2. SCHWERDTFEGER, F. Zur Engerlingsbekämpfung durch Vollumbruch. **[On the control of cockchafer grubs by full ploughing.]** *Dtsch. Forstw.* 22, 1940 (337–9). [G.] Biol. Abs. 15 (11281).

Infestation by *Melolontha hippocastani* was reduced 23–50 per cent. by repeated clean cultivation. The ground should be cultivated between 15th May and 15th September, when the grubs are near the surface, and between 15th May and 15th June of the year in which they pupate. If the ground is too dry the grubs will be at too great a depth to be injured, but cultivation should be done on warm sunny days so that the grubs turned up will be killed by exposure.

45.3 : 13.2 : 31.43 (59.5). BROWNE, F. G. **The economic importance of Malayan ambrosia beetles.** *Malay. For.* 10, 1941 (59–68).

Includes a list of recorded species indicating, for each, present abundance, type of material infested, hosts, and economic importance.

45.3 : 13.2. UNITED STATES. **Twentieth annual report of the Southern Forest Experiment Station, January 1, 1940–December 31, 1940.** New Orleans, La. [1941]. pp. 39.

Carbon disulphide poured into ant holes was effective in controlling the Texas leaf-cutting ant (p. 20).

45.3 : 13.2. NOLTE, H.-W. Freilandversuche mit den Delicia-Stäubemitteln Forststäubol II und III gegen Nonnenraupen. [**Field tests of the 'Delicia' dust insecticides 'Forststäubol' II and III against nun-moth caterpillars.**] *Thar. forstl. Jb.* 92, 1941 (109–17). [G.] [Forstliche Versuchsanstalt Tharandt.]

These insecticides are manufactured by the Chemische Fabrik Delitia in Delitzsch and contain dinitro-ortho-cresol and arsenic, respectively. In the tests described they proved fully effective and in no way inferior to similar commercial products of other firms.

45.3 : 13.2 : 13.15. GÄBLER, H. Aus der Forschungsstelle für Nonnenbekämpfung der Sächs. Forstl. Versuchsanstalt Tharandt. [**From the section for research on nun-moth control, Sächs. Forstl. Versuchsanstalt Tharandt.**] *Allg. Forst- u. Jagdztg.* 116, 1940 (269–75). [G.] Biol. Abs. 15 (11430).

Data on the number of moultings of nun-moth caterpillars, their size at different stages, the total number of droppings during each stage, and the relation between daily number of droppings and quantity of needles eaten, are given separately for male and female caterpillars.

45.3 : 23.27. FLINT, W. P., and FARRAR, M. D. **Protecting shade trees from insect damage.** *Circ. Univ. Ill. Coll. Agric.* No. 509, 1940. pp. 59. [Illinois State Natural History Survey, Urbana.] P.R.

Contains descriptions of and control measures against shade-tree pests, arranged under host species, brief descriptions of potential insect pests, and a note on the special equipment needed for shade-tree spraying.

47. COLLECTIVE INJURIES TO INDIVIDUAL TREE SPECIES

47 : 12.25. SIGGERS, P. V., and DOAK, K. D. **The little-leaf disease of Shortleaf Pines.** *Occ. Pap. Sth. For. Exp. Sta.* No. 95, 1940. pp. 5. [Bureau of Plant Industry, U.S.D.A.]

There is a gradual but widespread dying of Pine trees due to unknown causes in the southeastern States. Deterioration of the feeding roots is involved. The main symptoms of the disease above ground are (1) premature loss of foliage, (2) death of branches, starting with those closest to the ground, and (3) persistence on the twigs of short, yellowish needles of the current growing season. Little-leaf disease is distributed mainly through the southern part of the commercial range of Shortleaf Pine in South Carolina, Georgia, and Alabama. Observations indicate that Shortleaf Pine is the most susceptible species, that Loblolly Pine is less affected and that Longleaf Pine has not so far shown definite symptoms of the disease. *From authors' summary.* [Cf. *For. Abs.* 3 (84).]

47 : 43.3 : 44.3 : 45.12 : 45.3 (74). BALDWIN, H. I. [Editor]. **Important tree pests of the Northeast.** Massachusetts Forest and Parks Association, Boston. 1940. pp. 187. Biol. Abs. 15 (13757).

A collected and revised edition of *Tree Pest Leafl.* Nos. 1–50, provided with indexes to host species, pests, and diseases.

5. MENSURATION. INCREMENT. YIELD

52. MEASUREMENT OF TREES AND TIMBER

52 : 12.26–8 : 01.7. NAKAYAMA, J. **On the rate of error caused by several methods of measurement in the sectional area and stem volume of Camphor trees.** *Bull. Sch. Agric. For., Taihoku* No. 2, 1941 (1–23). [Jap.e.]

52 : 21.9 : 12.26–8. STRUGNELL, E. J. **Tree size in Negri Sembilan.** *Malay. For.* 10, 1941 (72–4).

The maximum and the average sizes of trees of the genera *Dipterocarpus* and *Shorea* felled for exploitation in lowland forest in Negri Sembilan are discussed, as well as the increase in height with increasing girth and the variation in the proportion of clear bole to total height. *Author's summary.*

52.4. *Measurement of Volume*

52.4 : 01.7. SAMMI, J. C. **Volume by moment.** *Bull. N.Y. St. Coll. For.* 13 (3–b) [*Tech. Publ.* No. 52], 1940. pp. 18.

The method suggested depends on the plotting of the diameter and height measurements of a tree on rectangular co-ordinate paper, joining the plotted points by a smooth

curve, tracing over this profile with an integrating instrument of the *second* order, and multiplying the result by a constant to obtain the volume. The method is based on one of the theorems of Pappus, which indicates that a plane area bounded by a closed curve, revolving about an axis, generates a solid the volume of which is the product of the revolving area by the distance travelled by its centre of gravity. Expressed mathematically this becomes $V = 2\pi\bar{r}A$, where V is the volume of the solid, $\bar{r}$ is the distance to the centre of gravity from the axis of revolution, and A is the revolving area. While it is entirely feasible to find, purely by mathematics, the centre of gravity of a geometrical figure, no such method is practicable if the area under consideration is irregular in outline as is the profile of a tree or log. However, as it is possible to obtain the area of an irregular figure by means of a planimeter it is likewise possible to obtain the force moment of such a figure by means of a mechanical integrator of the second order. But the force moment, M, is the product of the area, A, by the length of the moment arm, $\bar{r}$. Substituting M in the original expression in place of $\bar{r}A$ the formula becomes $V = 2\pi M$. The 'volume by moment' method is shown to be more precise than either Smalian's or Huber's formula. The method is applicable to the determination of form factors. The integrating instrument used costs about $300.

52.43.2. WILSON, S. E. **Measuring round timber.** *Timb. Tr. J.* Annual special issue, 28th May, 1941 (15–6, 45).

A discussion of quarter-girth systems of measurement in general and of the Hoppus system in particular. The formula for the latter is

$$\frac{\frac{(\text{girth in inches})^2}{4} \times \text{length in feet}}{144} = \text{solid feet.}$$

The unit of quantity used with this method is approximately $1\frac{1}{4}$ cu. ft. and is termed a 'Hoppus foot'.

52.43.2 : 33.01 : 35 (74.7). CARPENTER, R. D. **Log purchasing units in northeastern New York State.** *Tech. Note Ntheast. For. Exp. Sta.* No. 44, 1941. pp. 5.

Prices paid under the seven different measures of log volume currently used in this area are fairly uniform and there appears to be no reason why a single system of measurement should not be adopted.

52.43.3 : 12.26–8. SCHRAMM, W. O., and KELLOGG, L. F. *Tech. Note cent. St. For. Exp. Sta.* Nos. 27 and 30, 1941.

Local volume tables for White Oak (*Quercus alba*) and White Ash (*Fraxinus americana*) in Franklin County, Ohio.

52.43.3 : 12.25 : 12.26–8. CRAWMER, J. R., and KELLOGG, L. F. *Tech. Note cent. St. For. Exp. Sta.* Nos. 24, 25, 26, and 29, 1941.

Local volume tables for Yellow Poplar (*Liriodendron tulipifera*), Eastern White Pine (*Pinus strobus*), Eastern Hemlock (*Tsuga canadensis*), and White Oak (*Quercus alba*) in Holmes County, Ohio.

52.43.3 : 12.26–8. DILLER, O. D., and KELLOGG, L. F. **Local volume table for Yellow Poplar (*Liriodendron tulipifera*) in Hamilton County, Ohio.** *Tech. Note cent. St. For. Exp. Sta.* No. 22, 1940. p. 1.

52.43.3 : 12.25 : 52.3. HALLIN, W. **Volume and taper tables for old-growth coastal Redwood.** California Forest and Range Experiment Station, Berkeley. 1941. pp. 79.

52.43.3 : 12.25 : 24.2. SAVULESCU, A. Tarife de cubaj pentru molift, arbori din răritură. **[Volume tables for Spruce from thinnings.]** *Rev. Pădurilor* 53, 1941 (125–35). [Rum.f.]

The tables are for dominated trees, such as are usually removed in low thinnings under Rumanian practice.

52.43.4. KRENN, K. Über Näherungsverfahren zur Berechnung der Durchmesser der Hohenadlschen Mittelstämme, dargestellt an einem extremen Bestandesbeispiel. **[On the approximation methods for calculating the diameter of Hohenadl's sample trees, as exemplified by an extreme type of stand.]** *Allg. Forst- u. Jagdztg.* 116, 1940 (228–34). [G.] Biol. Abs. 15 (11265).

In an irregular two-storeyed stand of Red Oak results within 0·2 per cent. of the true volume were obtained by applying Hohenadl's method of computing stand volume by means of a large and a small sample tree selected by statistical methods. Short-cut methods of selecting the sample trees were also tested. Selection by counting off 16 per cent. from the top and bottom of a list of trees arranged in order of diameter gave an error of 5·9 per cent., but this should be much less in stands with

more regular diameter distribution. The use of diameter classes wider than Hohenadl's reduced computation work and gave results generally within 1 per cent. of accuracy. The most accurate short method consisted in counting off the small sample tree at 16 per cent. from the smallest diameter and finding the large sample tree by subtracting the basal area of the small tree from twice that of the tree of mean basal area for the stand.

53. SOLID CONTENTS OF STACKED MATERIALS. REDUCING FACTORS

53 : 33.02 : 12.25. WUOTI, E. **[Solid contents of stacked pulpwood.]** *Papp. Trävaru-Tidskr. Finl.* 22, 1940 (431–3). *Abstr.* in *Auszüge aus der Literatur*—suppl. to *Papierfabrikant* 39, 1941 (62). P.R.

The reducing factors for converting stacked to solid measure average 0·78 for 1-m. logs of south-Finnish Spruce pulpwood with a mean mid-diameter of 15–20 cm., and 0·765 for those with a mean mid-diameter of 12–15 cm. Factors for good (I), average (II) and poor (III) quality pulpwood in 1- to 6-m. lengths are shown in the accompanying table:—

	1*m.*	2*m.*	3*m.*	4*m.*	5*m.*	6*m.*
I	0·780	0·750	0·730	0·715	0·705	0·700
II	0·765	0·730	0·705	0·685	0·670	0·660
III	0·750	0·710	0·680	0·655	0·635	0·620

53 : 33.02 : 12.25. MILLER, R. H. **Measuring green Southern Yellow Pine pulpwood by weight or cord.** *Sth. Pulp Paper J.* 4 (1), 1941 (10–1, 19). [Forest Products Laboratory, Madison, Wis.]

It is concluded that if certain refinements are used with each method of measurement neither of them will have a marked superiority over the other in determining the actual amount of solid wood. For the type of wood in which moisture varies considerably the method by weight would have to be supplemented with fairly accurate sampling for moisture determinations.

53 : 12.26–8. BARRETT, L. I., BUELL, J. H., and RENSHAW, J. F. **Some converting factors for mixed Oak cordwood in the southern Appalachians.** *J. For.* 39, 1941 (546–54). [Appalachian Forest Exp. Sta.]

The solid contents of stacks of Oak topwood and crooked, knotty bolewood increases significantly as the percentage of round sticks increases, and as the number of sticks per unit increases. Therefore a single, average converting factor for such wood is used at risk of considerable error. Converting factors for wide ranges in stick size and percentage round are presented graphically. The solid cubic contents of stacked units of straight, split Oak bolewood does not vary with the size of the sticks and the use of a single average converting factor therefore appears justified.

For topwood and crooked, knotty bolewood the number of cu. ft. of solid wood per unit varied from 81 to 107 for the piles used, and averaged 93. The average solid content per unit for split bolewood was 109 cu. ft.

The number of bd. ft. per stacked unit of wood varies widely with length and diameters of logs; explanations for these variations are given. The use of a single factor to convert stacked cordwood volume to bd. ft., or the reverse, therefore, may result in considerable error. Board-foot contents of units of split cordwood are tabulated. *From authors' summary.*

56. INCREMENT

56.02 : 11.21 : 09.2. DOUGLASS, A. E. **Notes on the technique of tree-ring analysis, II.** *Tree-Ring Bulletin* 7, 1941 (28–34). [University of Arizona, Tucson.]

56.02 : 11.21 : 09.2. SCHULMAN, E. **Some propositions in tree-ring analysis.** *Ecology* 22, 1941 (193–5). [University of Arizona, Tucson.]

The fundamental principles used in tree-ring analysis are those of selection, cross-dating, and sensitivity. The principle of selection recognizes that only certain species of trees and only certain individuals in any one species will show clearly in their annual-ring widths the effects of favourable or unfavourable seasons; thus the object in collecting a group of specimens for chronology studies is definitely not to get a random sample of all trees in the region to be represented by the group. In cross-dating,

the ring record of each tree is checked against that of other trees in the group, thus rendering possible the recognition of abnormalities such as false or missing annual rings. The cross-dated group, and not the individual tree, is the unit of study. The final principle of sensitivity states that the more marked the fluctuations in width of a series of cross-datable rings from year to year, the better in general is the climatic record presented by the series. Application of these principles in the examination of large number of specimens has led to results which are stated in the following 'propositions': (i) Every possible degree of variation occurs in sharpness of the outer boundary of annual rings. (ii) There exists a complete array of types of false annual rings ranging from those that are extremely ill-defined to those that cannot be distinguished from true annual rings until they are cross-dated. (iii) The cambium of trees of many species may be locally dormant, in the sense that no new cells are produced, throughout one or more growing seasons. (iv) The relative importance of any one of the environmental factors operating on tree growth varies from region to region and site to site; under certain conditions significant fluctuations in annual radial growth may be related almost entirely to one factor alone, such as precipitation.

56.02 : 11.21 : 11.11 : 11.14 : 21.2 : 21.12. LYON, C. J. **Tree growth beside a rain gauge and thermometer.** *Ecology* 21, 1940 (425–37). [Dartmouth College, Hanover, New Hampshire.]

A study was made of the influence of rainfall and temperature on ring width in mature trees of White, Scots and Austrian Pines, Norway Spruce, European Larch, and Red Oak, the period covered being between 70 and 80 years. For the full length of their growth records, White and Scots Pines and Red Oak gave significant positive correlations with the rainfall of certain periods of the year, but the remaining species showed no consistent agreement with precipitation records. Little agreement was found between growth and the temperatures of the growing season, though all the coniferous species gave significant positive correlations between annual growth and March–April (dormant-period) temperatures. The latter indirect influence is presumably due to the effect of early spring temperatures on the amount of water received by the forest soil from melting snow, and to the effect of soil thawing in relation to this and to current precipitation. It is also possible that April air temperatures may have a delayed effect upon soil temperatures in early May. The following specific conclusions are reached:—(i) White Pine is outstandingly sensitive both to rainfall and to water supplied by temperature effects in early spring. (ii) Scots Pine is less sensitive, but responds well to rainfall during the growing season. (iii) Austrian Pine depends chiefly on water supplies before the growing season, during which it is influenced by a combination of factors. (iv) Norway Spruce grows in proportion to the water made available by temperature effects during March to May. (v) European Larch benefits from a similar early water supply, but also responds directly to May air temperatures. (vi) Red Oak alone shows no response to water supplied before the growing season but does react to some extent to rainfall during the growing season. This species was unique in giving a positive response to July temperatures.

56.02 : 11.21 : 11.14 : 12.25. VERMONT. **Agricultural Experiment Station. Fifty-third annual report, 1939-1940.** *Bull. Vt. agric. Exp. Sta.* No. 463, 1940. pp. 31.

A study of the factors influencing the diameter growth of White Pine indicates that for the region in question there is no correlation between diameter growth and the amount of seasonal or annual precipitation (p. 19).

56.02 : 11.21 : 12.25. HANSEN, H. P. **Ring growth in three species of conifers in Central Washington.** *Ecology* 22, 1941 (168–74). [Oregon State College, Corvallis.]

A study of Western Yellow Pine, Western Larch, and Douglas Fir in central Washington near the lower edge of the Arid Transition (timbered) Zone revealed a limited annual ring growth. Of the 3 species studied, Yellow Pine exhibited the least and Douglas Fir the greatest growth. In correlating ring growth with precipitation for 36 years, Douglas Fir responded positively most often and Yellow Pine the least. There was little difference in the degree of correlation with the annual, March to August, and a modified annual precipitation curve. The limited ring growth indicates that the physical factors of the environment are neither at an optimum nor in adjustment with one another. The low summer rainfall and the high temperature seem to be the dominant

opposing factors that prevent normal growth. *From author's summary.*

57. DEVELOPMENT AND STRUCTURE OF STANDS. YIELD

57 : 12.25 : 12.19.2 (78.9 : 79.1). HOWELL, J. **Pinon and Juniper woodlands of the Southwest.** *J. For.* 39, 1941 (542–5). [Soil Conservation Service, Albuquerque, N. Mex.]

A preliminary sample-plot study was made in coniferous woodland stands of northern New Mexico and northeastern Arizona. These woodlands, consisting mainly of *Juniperus monosperma*, *J. scopulorum* and *Pinus edulis* with scattered *P. ponderosa* and *Quercus* (Gambel's Oak) are found at middle elevations between the Ponderosa Pine type and the semi-arid grasslands and have an annual rainfall of 10 to 20 in., which occurs mainly in the summer. They furnish considerable quantities of fuelwood, fence posts, poles and pinon nuts. Variation in habit and volume production of individual trees, stand composition, types, growth, yield, and management are discussed on the basis of the present study.

57 : 12.25 : 12.11.3. KÜGLER, F. Beobachtungen über die Massenerträge der Fichte in Lettland. **[Observations on the volume yield of Spruce in Latvia.]** *Z. Forst- u. Jagdw.* 73, 1941 (48–51). [G.]

Volume data for mature even-aged stands of Spruce, Spruce/Pine, and Pine, the past treatment of which had been confined to light low thinning, indicate that for a given mean height, age, and density of stand, the volume is approximately the same whatever the proportion of Spruce and Pine. These data accord with the yield tables for the St. Petersburg region prepared some 80 years ago by the Russian investigator Count Vargas de Bedemar. In Germany, the timber volume of old Spruce stands is considerably above that of comparable Pine stands and also above that of Baltic Spruce. It is thought that this divergence between German and Baltic Spruce may be due to differences in climatic origin.

57 : 12.26–8 : 22.89. BRITISH GUIANA. **Report on the Forest Department for the year 1939.** Govt. Printer, Georgetown, Demerara. 1941. pp. 9.

A Redwood (*Centrolobium paraense*) plantation was successfully established and showed maximum height growth of 15 ft. at the end of the first year (p. 6).

57 : 12.26–8 : 23.24.3 (45). BUZZONE, Z. La quercia rossa (*Quercus rubra* L.). **[The Red Oak (*Quercus rubra* L.).]** *Riv. for. ital.* 2, 1940 (459–65). [It.] Biol. Abs. 15 (11248).

Q. rubra (*Q. borealis*) grows well and produces excellent timber in northern Italy. Information is given on rate of growth and form of trees planted in numerous localities. There should not be more than 1,000 trees per ha. at the start, and the number should later be reduced to 300–400.

57 : 56 : 12.19.2. JENSEN, V. S. **Eight years' growth in hardwood stands on the Bartlett Experimental Forest.** *Tech. Note Ntheast. For. Exp. Sta.* No. 43, 1941. pp. 4.

With reference to a typical 2,500-acre tract of northern hardwood forest in the White Mountains, New Hampshire, in which little cutting has taken place since 1900. Ninety-eight per cent. of the forest volume is distributed among ten species—Beech, Yellow Birch, Sugar Maple, Red Maple, Paper Birch, White Ash, Aspen, Red Spruce, Balsam Fir, and Eastern Hemlock.

57.0 : 56 : 22.82.1 : 12.26–8. BURGER, H. Holz, Blattmenge und Zuwachs. IV. Ein 80jähriger Buchenbestand. **[Wood, quantity of foliage, and increment. IV. An 80-year-old stand of Beech.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 21, 1940 (307–48). [G.g.f.]

The relationships between crown development, amount of foliage, and increment were examined in an 80-year-old dense Beech stand, the past treatment of which had consisted in light low thinnings. In this, as in other dense pure Beech stands, the amount by weight of branchwood and foliage varied little for trees of the same diameter whatever their site. With increasing diameter the amount of branchwood rose steeply, while the amount of foliage increased more gradually. The foliage of the larger trees was more 'efficient' than that of the smaller ones; thus in the case of the dominant trees an annual timber increment of 1 cu.m. was produced per 700 kg. (fresh weight) of foliage or 13,000 sq. m. of leaf surface, while the corresponding figures for the dominated trees were 1,400 kg. and 34,000 sq.m. respectively. The stand produced annually 1·8 kg. (dry weight) of timber for each kg. (dry weight) of foliage, the relative amount of dry matter used in foliage production being greater in this case than in that of previously studied Spruce stands.

6 : 22.88.1. FRÖHLICH, J. Die Forstbetriebseinrichtung im Urwalde. **[Forest management in virgin forest.]** *Cbl. gesamte Forstw.* 67, 1941 (80–9). [G.]

A general discussion with reference to south-eastern Europe and Turkey.

60. GENERAL LAND MANAGEMENT

60 : 09.1 (74.4). RAUP, H. M., and CARLSON, R. E. **The history of land use in the Harvard Forest.** *Bull. Harv. For.* No. 20, 1941. pp. 64.

The land use of the area now bearing the Harvard Forest has been determined from the time of the first clearing of original forest for cultivation and pasture up to the present by means of a study of the available records, including deeds and other historical documents, and the re-establishment of the original land-division boundaries in the field. These data have shown that certain areas delimited on the ground have always been under forest. These relic pre-colonial forests and descriptions of the primeval forests that are contained in authentic historical accounts of the area together furnish information on the natural correlation of site and species composition and of the potential timber-producing capacity of the area and these data can be used as a basis for the future management of the forests.

60 : 12.19 : 11.2 : 11.14 (213). OLIPHANT, J. N. **The need for research on the soil-vegetation-climate relationship.** *Niger. For.* 1 (2), 1940 (36–41).

The inter-relations of soil, vegetation and climate, and the influence of these factors on soil fertility and on the environment in general is considered as one of the most important fields for future research in the Colonies. Examples are cited where it is apparent that present practices in land management do not make the best use of the natural vegetation, particularly in regard to soil fertility. In some regions soil deterioration is increasing rapidly. Fundamental research into the character and composition of natural vegetation and into the direct and indirect influence of this and other factors on soil fertility should be undertaken as the first step toward improving cultural practices and bringing about a more efficient adjustment between environment and crop. The research organization necessary for preliminary reconnaissance work on this problem is outlined.

60 (71.3) : 97.1 : 94 : 11.6 : 09.7. CARMAN, R. S. **Wilmot Creek Drainage Unit (northern part): A study in forest conservation and land use.** Ontario Forestry Branch. 1940. pp. 55 + maps.

A study of the Wilmot Creek Drainage Area in Durham County, Ontario, was undertaken by the Forestry Department of the Province with the object of obtaining information to form the background for a programme of reforestation and conservation. Much of the material was obtained by making a farm-to-farm canvass throughout the area and asking the landowners a definite set of questions on land-utilization problems. In addition information was obtained on the geology, meteorology, history, agriculture and forestry of the area from available records and the material obtained from these various sources is analysed in this report.

60 : 97.3 : 34.21 (75 : 76). TERRY, E. I. **The future of forestry and grazing in the Southern Pine belt.** *Scientific Monthly, New York* 52, 1941 (245–56). [Winthrop College, South Carolina.] L.S.

From this discussion of past land use and future possibilities of improvement in the Southern Pine region of the United States it is concluded that the interests of the forester and the stockman are incompatible. Annual burning may improve the value of the land for grazing, but grazed and burned woodlands give at once poor pasturage and poor timber crops. The only solution of this conflict of interests is, therefore, to raise livestock and timber on separate lands. Official agricultural agents in the region are advocating the establishment of permanent improved pastures, and the disappearance of forest pasturage should be hastened by the increasing development of the pulp and paper industry, for proper forest management will be essential if such an industry is to be kept on a permanent basis, as neither grazed Pine forests nor turpentine orchards can maintain an adequate supply of pulpwood for any length of time.

60.1. *Management of Non-forest Land*

60.1 (79.2) : 12.19.3. STEWART, G. **Historic records bearing on agricultural and grazing ecology in Utah.** *J. For.* 39, 1941 (362–75). [Intermountain Forest & Range Exp. Sta.]

60.3. *Management of Different Classes of Forest*

60.31 : 57 : 76. PEARSON, G. A., and WADSWORTH, F. H. **An example of timber management in the Southwest.** *J. For.* 39, 1941 (434–52). [Southwestern Forest & Range Exp. Sta.]

Detailed discussion of the development—increment, mortality, and natural regeneration—and future possibilities of a stand of Ponderosa Pine, 480 acres in extent, that was first cut over in 1909 leaving a residual stand of 3,542 bd. ft. per acre, and was cut again under three silvicultural methods in 1939, after which the residual volume per acre averaged 2,995 bd. ft. During the thirty years between cuts the mean annual net increment averaged 81 bd. ft. and mortality averaged 21 bd. ft. per acre. The area has restocked fairly well with natural reproduction, particularly as a result of the 1919 seedling crop.

60.31.2. STRAUSS, C. W. **Using a practical approach in private forest management work.** 'Forestry in Relation to Agriculture', Southern Region, U.S. Forest Service, Atlanta, Ga. 1940. pp. 29–35.

60.31.2 (76.1). LEACH, M. C. **What sound forest management means to an Alabama lumber company.** 'Forestry in Relation to Agriculture', Southern Region, U.S. Forest Service, Atlanta, Ga. 1940. pp. 36–9.

Two papers dealing with the subject 'A new approach in assisting woodland owners to better forest practices.'

60.31.2 : 12.19.2 : 12.25 (78 : 79). HOFFMAN, B. **Problems of private forestry in the Douglas Fir region.** Charles Lathrop Pack Forestry Foundation, Washington, D.C. 1940. pp. 21.

A general discussion of the major economic problems involved in applying the principles of sustained-yield management in the private forests of the Douglas Fir region of western Washington and Oregon. A hypothetical case is presented to illustrate the plan of study required by the private owner who wishes to apply these principles in his forest.

60.31.2 : 12.19.2 : 12.25. (78 : 79). HOFFMAN, B. **Management possibilities in Douglas Fir forests.** Charles Lathrop Pack Forestry Foundation, Washington, D.C. 1941. pp. 45.

This report presents the results of a 3-year study in the Douglas Fir Region and is concerned particularly with 'the financial aspects of growing timber crops, the analysis of timber qualities, and the appraisal of various factors in production cost'. The principal topics dealt with in the report are: factors affecting tree growth, including site quality and density of stocking; yield and financial analysis; determination of timber volume and quality; and determination of timber value. It is concluded that there is opportunity for private timber cropping on extensive areas in this region but each area must be analysed for its own management problems, the most important factors to be taken into consideration being: (*a*) The productive capacity of the land. (*b*) Opportunities for utilization and marketing. (*c*) Fire protection, costs and hazards. (*d*) Taxation. (*e*) Possibilities of adequate financing.

60.31.2 : 66. MARTIN, C. S. **Management of private timber lands for a second crop.** *W. Cst. Lumberm.* 68 (5), 1941 (11–2). [Weyerhaeuser Timber Co., Tacoma, Wash.]

Discussion of the management practices of the Weyerhaeuser Timber Co. in western Washington with reference to land classification, protection, reforestation and research. The maintenance of full stocking by planting up gaps in the natural regeneration has been found to be the best procedure for obtaining a maximum of high-quality timber at lowest cost. This involves the planting of approximately 30 per cent. of the cut-over lands.

60.31.2 : 94.4 : 97.2 : 98. COLLINGWOOD, G. H. **Industrial proposals toward cooperative relations in forest land management.** *J. For.* 39, 1941 (453–6). [National Lumber Manufacturers Association.]

Proposals relate to increased forest protection, furtherance of state legislation based on experience of the lumber industry, forest educational programme for the public, and cooperation in the use of forest land owned by the federal and state governments and by private concerns.

60.31.2 : 94.4 : 96 (485). KIRKLAND, B. P. **Forest cooperatives and public assistance to private forestry in Sweden.** 'Forestry in Relation to Agriculture', Southern Region, U.S. Forest Service, Atlanta, Ga. 1940. pp. 1–5.

60.31.2 : 94.4 : 97.2 (76.2). MCNEIL, C. **Possibilities and problems in farmers' co-operatives in Mississippi.** 'Forestry in Relation to Agriculture', Southern Region, U.S. Forest Service, Atlanta, Ga. 1940. pp. 6–9.

60.31.2 : 94.4 : 97.2 (76.2). PAYNE, M. A. **Steps now being taken in the development of a farmers' woodland products co-operative in Clarke County, Mississippi.** 'Forestry in Relation to Agriculture', Southern Region, U.S. Forest Service, Atlanta, Ga. 1940. pp. 10–1.

A symposium on the subject 'Co-operative marketing of farm woodland products'.

60.31.2 : 97.2 (410). ACKERS, C. P. **Private estates and forestry.** *J. R. Soc. Arts* 89, 1941 (382–90).

A general discussion of the history and present condition of private forestry in Britain, with suggestions for post-war reconstruction under State control and with Government collaboration.

60.31.2 : 97.2 (75.5–9 : 76.1–2). LOWE, J. N. **The place of woodland management in the economy of the farm from an agronomic point of view.** 'Forestry in Relation to Agriculture', Southern Region, U.S. Forest Service, Atlanta, Ga. 1940. pp. 13–7.

60.31.2 : 97.2 : 95.2 : 96.4 : 91.8 (75.7–9 : 76.1). BAILEY, H. R. **Farm woodlands in the program of the Farm Security Administration.** 'Forestry in Relation to Agriculture', Southern Region, U.S. Forest Service, Atlanta, Ga. 1940. pp. 18–21.

60.31.2 : 97.2 : 97.1 (75 : 76). HARTMAN, W. A. **Agricultural land-use planning and forestry.** 'Forestry in Relation to Agriculture', Southern Region, U.S. Forest Service, Atlanta, Ga. 1940. pp. 22–8.

These three papers discuss various aspects of the general subject 'Place of woodland management in the economy of the farm'.

60.31.2 : 97.2 (75 : 76). DEMMON, E. L. **The contributions of forestry under changing conditions in Southern agriculture.** 'Forestry in Relation to Agriculture', Southern Region, U.S. Forest Service, Atlanta, Ga. 1940. pp. 42–9.

This paper includes examples of successful intensive management of farm woodlands in the southern United States.

61. SURVEYING. MAPPING

61.3 (73). WINTERS, R. K. **The American Forest Survey.** *Univ. Wash. For. Cl. Quart.* 14 (2), 1940–41 (14–20). [U.S. Forest Service.]

Brief description of the methods employed.

61.32. SEELY, H. E. **Plotting the forest map from vertical air photographs.** *For. Chron.* 17, 1941 (79–80). [Dominion Forest Service, Ottawa.]

A note on a simplified procedure for constructing a map from aerial photographs by which only about one-third of the photographs were plotted by the radial intersection method. A sample map illustrates the procedure.

61.32. MEYER, J. Der Einsatz des Flugzeugs bei künftiger forstlicher Forschung und Planung. **[The role of aircraft in future forest investigation and planning.]** *Forstarchiv* 17, 1941 (123–30). [G.]

64. DESCRIPTION OF SITE. ASSESSMENT OF SITE AND STAND QUALITY

64 : 56 : 57. RAY, R. G. **Site-types and rate of growth, Lake Edward, Champlain County, P.Q., 1915 to 1936.** *Silvic. Res. Note Dom. For. Serv.* No. 65, 1941. pp. 56 + tbls. [Valcartier Forest Exp. Sta.]

The area reported on, which is 5½ sq. miles in extent and located in southern Quebec, was cut over for pulpwood in 1890 and about 1910 under a form of selection cutting based on diameter limits. The timber types, which are mainly Yellow Birch (*Betula lutea*), Spruce and Balsam Fir, are representative of extensive areas in southern Quebec and central Ontario. Line-plot surveys were made of the area in 1925 and 1936 and the data were classified by site-types identified by plant indicators. More than 90 per cent. of the area is represented by three main types; *Cornus* bearing softwood forest; *Oxalis*/*Cornus* bearing a softwood/hardwood mixture and *Viburnum*/*Oxalis* bearing hardwood/softwood forest. The data obtained from the two surveys are analysed in detail.

65. DESCRIPTION OF GROWING STOCK

65.2 : 54. LANG, A. Ein Vorschlag zur Bildung von Durchmesserstufen und Stärkeklassen bei der Forsteinrichtung. **[A proposal for the standardization of diameter gradations and size classes in forest management.]** *Allg. Forst- u. Jagdztg.* 117, 1941 (166–72). [G.g.]

A unified system is recommended whereby five diameter classes, each having a range of 12 cm., and calipering units of 4 cm. each, give sufficient accuracy for the marketing of timber of the chief species on the basis of recognized German assortments.

66. POSSIBILITY. SUSTAINED YIELD. YIELD REGULATION

66. FRITZ, E. **Sustained yield therapeutics.** *J. For.* 39, 1941 (465–7). [University of California.]

It is pointed out that sustained yield is a policy of management rather than a method, and that its undertaking in a new region must be based on knowledge of facts relating to silviculture, economics and other matters. The problem of applying a policy of sustained yield in the forests of the western United States is discussed and ten obstacles to its application are listed.

66 (71). **Sustained yields from Canadian forests.** [Abstracts of paper by J. E. Guay and discussions by W. H. Price, J. G. Robson, and R. J. Filberg.] *For. Chron.* 17, 1941 (63–8).

The paper by J. E. Guay, after discussing the problems preliminary to and connected with the preparation of a working plan, deals in particular with the present management practice on the Crown timber lands of the Province of Quebec, which are cut under license and according to Government regulation. [Cf. *For. Abs.* 3 (88).]

66 (71.1). HODGINS, H. J. **Factors governing the selection of practical working circles in B.C.** *B.C. Lumberm.* 25 (5), 1941 (28–9). [B.C. Forest Service.]

The selection of working circles implies the application of sustained yield management, and two factors are considered of primary importance in effecting the introduction of such forest practice into British Columbia as a whole: (*a*) Re-adjustment of the financial structure of the timber industry and a forest administration that will give due consideration to this aspect of the problem. (*b*) Profitable markets and the ability of manufacturing industries to provide the most desirable products for those markets.

66 : 90 (73). [COLLINGWOOD, G. H.] **The trend towards permanent forestry in the United States.** *B.C. Lumberm.* 25 (7), 1941 (30, 32, 34).

8. ADMINISTRATION

8 : 12.25 (81). Fué creado en el Brasil el Instituto Nacional del Pino. **[A National Pine Institute has been founded in Brazil.]** *Maderil* 13 (152), 1940–41 (29–30). [Span.]

This Institute has been founded in Rio de Janeiro by a recent Government decree. The duties of the newly created centre will consist in promoting and regulating the production and utilization of, and the commerce with, Brazilian Pine. The Institute will have considerable compulsory power in such matters as the fixing of prices. It will maintain a statistical and information service.

82. LABOUR QUESTIONS

82 (485). WALLNER, O. Skogsbrukets säkerhetstjänst. **[An accident-prevention service for forestry operations.]** *Skogen* 28, 1941 (8–9). [Sw.]

It is recommended that on every large forestry operation there should be a special accident-prevention inspector and representatives elected by the workers. The inspector's duties should be to furnish reports and statistics of accidents, to provide instructional material for the workers and to do everything possible to encourage their interest in accident prevention. The fullest use should be made of the workers' representatives and of the foreman to secure the co-operation of the workers themselves. The 'Skogs- och flottledsinspektion' (Forestry and Timber Floating Board) in Stockholm has issued a special publication entitled 'The prevention of accidents in forestry work'.

82 : 32 : 09.4 (485). WALLNER, O. Ökat antal olycksfall vid vedavverkning. **[Increased number of accidents in fuelwood logging.]** *Skogen* 28, 1941 (111–2). [Sw.] L.S.

Accidents during the cutting and transport of

fuelwood increased from 1,188 in 1939 to 3,259 in 1940, largely as a result of the increased felling programme and the employment of many unskilled workers. Tables are given to show accidents by type of operation and actual cause, and graphs to show the relation of accidents to time of day and age of worker. The greatest number of accidents occurred in cross-cutting, trimming, cleaving, and felling, in the order named; the commonest causes were faulty axe and saw handling. Accidents were most frequent just before mid-day, probably owing to fatigue, and were far commoner among younger workers aged 18–25 than among older men.

82 : 32. HARRISON, F. A. **Accident control: an important factor in the cost of logging operations.** *Pulp Paper Mag. Can.* 42, 1941 (421–2). [Canadian International Paper Co.]

Brief description of the steps taken to reduce accidents in logging camps. Points emphasized include physical examination of men, personal contact between competent physician and men, employment of accident-conscious clerks in camps, and creating a competitive spirit between camps toward accident prevention.

9. FOREST POLICY

90. GENERAL PRINCIPLES OF FOREST POLICY

90 (410). WILSON, S. E. **British forestry.** *Wood* 6, 1941 (162–5).

State control over private woodlands is advocated as the chief measure of British post-war forest policy.

90 (73). COYLE, D. C. **Our forests.** National Home Library Foundation, Washington, D.C. 1940. pp. xi + 150. Biol. Abs. 15 (13417).

A concise statement of the forestry problems of the United States with reference to their history, present ownership of forests, current uses for lumber, pulp and paper, farm woodlots, shelterbelts, watersheds, grazing, and recreation. Recent developments in public ownership and in forest protection and improvement are reviewed. The problem of sustained yield is outlined and a programme for the recovery of cut-over lands by Federal purchasing and planting is proposed and its costs discussed.

90 (73). HOPKINS, H. **A nation-wide forestry program.**—With comments by Prof. M. Krueger. *J. For.* 39, 1941 (523–30). [U.S. Forest Service.]

A brief discussion of the present forest-land conditions and cutting practices on private land in California, and of the proposed nation-wide forestry programme as affecting public forests and forest research, followed by a more detailed consideration of the third aspect of this programme as affecting private forest land.

90 (73). BURT, W. R. **Forest lands of the United States. Report of the Joint Congressional Committee on Forestry.** *J. For.* 39, 1941 (349–52). [National Lumber Manufacturers Association.]

A summary of the important features of the recommendations of the Committee and of the main section of the report entitled 'Findings of Fact', which deals primarily with forest land in private ownership.

91. SOCIAL AND ECONOMIC SIGNIFICANCE OF THE FOREST

91. BRUÈRE, M. B. **What forests give.** Forest Service, U.S. Department of Agriculture, Washington, D.C. [Revised ed.] 1940. pp. 79.

A popular, illustrated account of the ways in which the forests of the United States are used, both as wood or other products and as growing trees.

91 (73) : 09.7. **Living and forest lands.** *Misc. Publ. U.S. Dep. Agric.* No. 388, 1940. pp. 47.

A popular, illustrated account of the forests of the United States with particular reference to their distribution, utilization, ownership and management.

92. FOREST LAW

92 (410) : 95.4. DAVEY, R. **The woodland owner and the War Damage Act, 1941.** *Quart. J. For.* 35, 1941 (117–9).

A brief account of the legal position in regard to voluntary and compulsory insurance and to related problems.

92 (43.7). BUROCK, R. Die Auswirkungen der Einführung des deutschen Strafgesetzbuches auf das Sudetendeutsche Forststrafrecht. **[The effects of the introduction of the German penal code upon the Sudeten-German forest penal law.]** *Thar. forstl. Jb.* 92, 1941

(101–3). [G.] [Sächsische Forstliche Versuchsanstalt.]

92 (43.7) : 91.1. BUROCK, R. Die Einführung des Reichsjagd- und Naturschutzrechtes im Reichsgau Sudetenland. [**The introduction of the German game and nature-protection laws into Sudetenland.**] *Thar. forstl. Jb.* 92, 1941 (103–8). [G.] [Sächsische Forstliche Versuchsanstalt.]

92 (43.7) : 99 : 81. BUROCK, R. Die Einführung des deutschen Arbeits- und Sozialrechtes im Reichsgau Sudetenland. [**The introduction of German labour and social laws into Sudetenland.**] *Thar. forstl. Jb.* 92, 1941 (83–100). [G.] [Sächsische Forstliche Versuchsanstalt.]

92 (494) : 96.3. Instructions du 25 mars 1941 pour l'exécution des défrichements. [**Instructions of 25th March, 1941 for the carrying out of forest clearance operations.**] *J. for. suisse* 92, 1941 (133–6). [F.]

These instructions aim at making available 2,000 ha. of land for agricultural use. The clearance operations are publicly subsidized and provision is also made for planting other areas to compensate for those cleared.

92 (498) : 94.3 : 94.6. POPESCU, C. V. Origina etnică a proprietarilor de păduri. [**Ethnical origin of forest owners.**] *Rev. Pădurilor* 52, 1940 (718–20). [Rum.f.]

Following a recent Rumanian decree 55,000 ha. of Jewish-owned forests have been confiscated by the State.

92 (75.1). **Delaware Forest Laws.** *Publ. St. For. Dep., Delaware* No. 4, [revised ed.] 1940. pp. 40.

92 (77.4) : 43.1. MICHIGAN. **Forest fire laws, including rules and suggestions relative to the careless use of fire.** Michigan Department of Conservation, Lansing. pp. 28.

92 (79.5) : 32.91.22. **Analysis of Oregon's new log trucking laws.** *W. Cst. Lumberm.* 68 (5), 1941 (42).

92 (79.5) : 32.91.22 : 07.7. AUER, C. W. **Analysis of Oregon's new logging truck law.** *W. Cst. Lumberm.* 68 (6), 1941 (16, 18). [White Motor Co.]

92 (82). GRÜNBERG, I. P. Proyecto de ley forestal. [**Draft of a forest law.**] *Instituto de Frutiviticultura y Silvicultura, Buenos Aires* 1 (1), 1940 (1–15). [Span.]

This draft refers chiefly to the proposed organization of a National Forest Service and differs in a number of points from that submitted to Congress on 11th February, 1938.

92 (91.1) : 94.12. SARAWAK. **Annual report on the Forest Department for the year 1940.** Govt. Printer, Kuching. 1941. pp. 13.

The Forest Law was amended to make provision for the constitution of communal forests, which are to be maintained under the District Officer in the form of a trust for the commune (p. 6).

92 (932–9) : 97.1 : 60 : 32. FIJI. **Forest Department.** (**Annual report for 1940.**) Legislative Council. *Council Paper*, No. 3, 1941. pp. 4.

An ordinance has been passed giving control of all native lands, including licensing of forest exploitation, to a Native Land Trust Board (p. 1).

92 (942) : 43.1. SOUTH AUSTRALIA. **Woods and Forests Department. Annual report for the year ended 30th June, 1940.** Govt. Printer, Adelaide. 1940. pp. 16.

By an amendment of the Bushfires Act it is required that notification be given of fires started within one mile of a forest, and provision has been made for a conditional burning period to precede and follow the prohibited burning period (p. 7).

94. FOREST OWNERSHIP

94.12 : 91.8 : 97.1 (74.8). MESAVAGE, S. **Community forestry as a substitute for illegal mining.** *J. For.* 39, 1941 (569–70). [Wyoming Valley Chamber of Commerce, Wilkes-Barre, Pa.]

Proposed plans for the acquisition of forest lands by local authorities in certain parts of the anthracite region of Pennsylvania, and for the improvement and management of the forests by the use of labour now engaged on illegal coal mining.

95. FOREST TAXATION. FOREST INSURANCE

95.1 (79.7) : 92. MCINTYRE, T. M. **New timber tax law now in operation.** *W. Cst. Lumberm.* 68 (6), 1941 (64). [Tax Commission of State of Washington.]

Comment on and illustration of the new 'Deferred Timber Tax Act' of the State of Washington.

95.4 (410) : 92. **War Damage Act, 1941, and Commodity Insurance Scheme. Woodlands and plantations.** *J. Land Agents' Soc.* 40, 1941 (186–7).

97. POLICY REGARDING THE RELATION OF THE FOREST TO AGRICULTURE, PASTURE, AND INDUSTRY

97.1 : 11.62 (71.1). LAIRD, D. G. **Differentiation of forest and agricultural lands.** *Sci. Agric.* 20, 1939–40 (291–6). [University of British Columbia, Vancouver.] L.S.

Soil surveys alone are insufficient as a basis for planning land use, and other factors must be taken into account, the chief of these being (*a*) economic size and accessibility of the proposed units, and (*b*) climate, topography, and effects of denudation as related to erosion and water conservation. The latter group of considerations is believed to be important in British Columbia, where rainfall is low in summer and many of the soils have a poor storage capacity for water. Though precise data are not available, observations suggest that unrestricted logging has resulted in greater flooding of the bottomlands and possibly lowered the water table on bench lands by increasing run-off from land at higher elevations. These points should therefore receive attention in future planning.

97.1 : 60 (66.9). URQUHART, D. H. **Land usage and utilization in Southern Nigeria.** *Niger. For.* 1 (2), 1940 (51–4).

Present practices in native farming and the effects of present methods of land usage in the Southern Provinces of Nigeria are reviewed briefly. Suggestions are made for the better use of the land and the work of the Agricultural Department in this regard is noted.

97.1 : 61 : 60 (66.9). ALLISON, P. A. **Irun: a first exercise in land-use survey.** *Niger. For.* 1 (2), 1940 (43–7).

A brief description of the history and economy of the village group of Irun and of the vegetation of the locality based on data obtained from the survey. The Savanna bush is classified into three types—'Savanna Woodland,' 'Savanna Thicket,' and 'Transitional Thicket', and the characteristic species of vegetation are noted for each.

97.1 : 60.31.2 : 94.3 (485). Centralrådet ersättes av skogsstyrelsen. **[The Central Council to be replaced by a Forestry Board.]** *Skogen* 28, 1941 (99–101). [Sw.] L.S.

The Central Council of the Union of County Forestry Boards [Centralrådet för skogsvårdsstyrelsernas förbund] has to a large extent met the need for a central organ to direct private forestry in Sweden, but has not had sufficient official standing to deal adequately with all the problems arising in this sphere. In order to remedy this deficiency, a government measure has been proposed whereby the Central Council would be replaced from 1st July, 1941, by a State body to be known as the Forestry Board [Skogsstyrelsen], which would consist principally of a chief assisted by four specialists in different branches of forestry, appointed by the State. The scope of the new body would cover the entire field of private forestry, and its work would be carried out in co-operation with the County Forestry Boards. The latter, however, would continue to be independent bodies representing the summation of local forestry interests, and would retain their freedom of action in their own field.

97.1 : 96.3 (494). HADORN, C. Schafft Raum dem Ackerbau! **[Make room for agriculture!]** *Schweiz. Z. Forstw.* 92, 1941 (79–84). [G.]

In order to become self-sufficient in food, Switzerland must more than double its present acreage of arable land. Before proceeding to the clearing of forest for agriculture—a lengthy and uncertain undertaking and specially undesirable in view of the increasing national demand for timber and firewood—Swiss pastures should be cleared of the millions of scattered unproductive fruit trees that interfere with the effective transformation of these pastures into arable land. The clearing of these relics of primitive horticulture would also furnish a considerable amount of firewood especially suited for use in gas producers.

97.3 : 34.21 : 93 (485). KLEVENFELDT, E. Ha vi råd att bibehålla skogsbetet? **[Are we wise to continue forest grazing?]** *Skogsägaren* 17, 1941 (70–1). [Sw.]

It is suggested that common grazing rights should be extinguished and a special area of pasture, situated as conveniently as possible, should be allocated to each right-holder. The State should forbid forest grazing after a period of, say, 15–20 years, and should give subsidies for the establishment of permanent improved pastures.

98. THE TIMBER MARKET

98 : 09.4 (497 : 498). SZENES, L. **Axis influence upon Balkan lumber industry.** *Sth. Lumberm.* 163(2047), 1941 (28–9).

A note on the developments in recent years by which Germany gained control of a high percentage of the lumber produced by Yugoslavia, Rumania, and other Balkan States.

98 (71). EADES, H. W. **Some technical problems of wartime lumber supply.** *For. Chron.* 17, 1941 (69–74). [Forest Products Laboratory, Vancouver.]

Brief discussion of wartime lumber problems in Canada.

98 : 09.4 (66.7). MOOR, H. W. **The Gold Coast timber industry.** *Niger. For.* 1 (2), 1940 (3–8).

A brief discussion of the timber industry, dealing particularly with the evolution of the timber-production system, the export trade, imports versus home-grown timbers for the local market, the sawmill industry, and the present and possible future value of the industry.

98 : 09.4 (66.9). BETTS, T. F. **The Benue timber trade.** *Niger. For.* 1 (2), 1940 (47–50).

Following an investigation of the timber trade of Northern Benue and the failure of early attempts to improve conditions, an organization has been developed under native administrations to deal with certain aspects of production and marketing and in general to increase the efficiency of the trade. This organization is outlined.

NOTES FROM THE DAILY AND THE NON-TECHNICAL PRESS

References: 1. *Aftenposten*, Oslo. 2. *B.B.C. Daily Digest*, London. 3. *Berliner Börsen-Zeitung*, Berlin. 4. *Berlingske Tidende*, Copenhagen. 5. *Deutsche Allgemeine Zeitung*, Berlin. 6. *Dominion*, Wellington. 7. *Examiner*, Launceston. 8. *Frankfurter Zeitung*, Frankfurt. 9. *Grenzbote*, Bratislava. 10. *Informaciones*, Madrid. 11. *Inter-American Quarterly*, Washington. 12. *Japan Times Weekly*, Tokyo. 13. *Kölnische Zeitung*, Cologne. 14. *Mañana*, Montevideo. 15. *Mercurio*, Santiago and Valparaiso. 16. *Montreal Gazette*, Montreal. 17. *National-Sozialistische Landpost*, Berlin. 18. *Neues Wiener Tagblatt*, Vienna. 19. *Royal Bank of Canada*, Montreal. 20. *Telegraph Journal*, St. John. 21. *Vancouver Sun*, Vancouver. 22. *Volkswirt*, Berlin. The numbers in brackets indicate the reference number and the date of publication of the newspapers to which the annotations refer.

Australia. For the first time a 'public field day' has been held by the Tasmanian Forestry Department. Over 200 guests inspected a departmental nursery in Perth and were addressed by a number of officials including the Minister of Agriculture and Forests and the Conservator of Forests, who gave talks on various matters connected with forestry in Tasmania (**7**; 20.4.41 and 25.4.41).

Canada. British Columbia has launched a reforestation scheme involving the planting this year of 6 million Fir trees on 6,000 acres of cut-over land. Planting will be done in six areas, five on Vancouver Island and one on the mainland. This year's project marks the first major expansion of the Government's programme to replace the forests of the Province, which are now being felled at a rate of some 60,000 acres a year. The Province needs farmlands, and soil surveys are needed to confine plantation work to absolute forest land. Over 20,000 acres have been surveyed so far (**21**; 6.2.41).

At a recent conference of the New Brunswick Government, the Canadian Forestry Association, and nearly 100 representatives of the forest industry and of various other interests, a plan was endorsed whereby precautionary measures against 'enemy action' will be extended to woodland communities throughout the Province. Voluntary local organizations appointed for the duration of the war will assume the task of preventing and fighting forest fires. Each unit will have its duties clearly defined and will be under the authority of the Provincial Forest Service. The purpose of the new plan is to identify forest fire damage with all other forms of injury to State property or subversive actions tending to handicap the country's efficiency in wartime. The Canadian Forestry Association, while not asserting that forest fires are commonly started by malicious persons, claims that the prevailing recklessness of the public in causing fire destruction requires the strongest possible curb (**16**; 18.3.41).

The total value of Canadian products exported to the United States in 1940 was $443 million, $63 million more than in 1939. Of this increase about $49 million is accounted for by increased export of wood and paper products. An increase of $19·7 million was shown in wood pulp (**19**; April, 1941).

A total of 138 million bd. ft. of saw timber was cut from New Brunswick Crown lands in the year ending 1st August, 1940. In addition, 328,000 cords of various products including pulpwood, pitprops, and spoolwood were cut. The increase in 1940 over the preceding year was 75 per cent. for saw timber and 110 per cent. for corded products. Figures for the cut during the current winter season are not yet available, but present indications are that it will be substantially less than expected, due particularly to the depth of snow in parts of the Province. The stumpage from the various products cut on Crown lands amounted to $835,000 in 1940 and to $452,000 in 1939 (**20**; 5.2.41).

Chile. The Chilean timber producers have formed a limited company, which, with Government support, is to raise 20 million Pesos in shares, this capital to be used for the establishment of conversion and seasoning plants, and the provision of credit for individual producers. (Exchange approximately 95 Pesos = £1.) The company's aim is to organize the timber industry as a whole, and, in particular, to regulate marketing and raise the quality of the timber produce (**15**; 8.6.41).

Denmark. As a result of drastic over-cutting, the State forests showed a profit of 3·6 million Kroner for 1940–1, which is three times as great as in the preceding year and represents 13 per cent. of the book capital (at par, 18·59 Kroner = £1) (**4**; 7.8.41).

Germany. The number of vehicles propelled by producer gas, including wood and charcoal gas, in Germany and German-occupied Europe has been estimated at 180,000. They save 648,000 tons of liquid fuels per annum. The immediate objective is to raise their number so as to save one million tons (**3**; 12.7.41 and **22**; 18.7.41). The Gesellschaft für Tankholzgewinnung and the Generator Kraft A.-G. have been amalgamated on the recommendation of the Ministers of Transport and Forestry. The new company is called the Generator Kraft A.-G. für Tankholz und andere Generatorenstoffe. The amalgamated capital of the two companies has been increased from Rm. 2 to Rm. 3·1 million and the purpose of the new company is to supply all producer-gas vehicles with solid fuels (**3**; 23.7.41).

According to estimates of the Institut für Konjunkturforschung, world production of cellulose wool increased from 10,000 (metric) tons in 1932 to 612,000 tons in 1940 and that of artificial silk from 243,000 tons to 522,000 tons. During the same period, German cellulose-wool production rose from 2,000 to 250,000 tons and German artificial-silk production from 28,000 to 80,000 tons (**3**; 23.5.41). It is stated that, owing to raw-material shortages, the civil demand for paper and the various allied products could not be fully satisfied in 1940 (**18**; 22.5.41). Despite large-scale purchases of pulp in Scandinavia, Germany's pulp imports amounted to only 850,000 tons, of which no less than 400,000 tons were used for animal feeding purposes. Germany's pulp industry has grown rapidly since 1933, and, in order to reduce the imports of foreign pulpwood, Germany had to exploit its own raw-material resources on a larger scale (**13**; 23.5.41). In recent years German Beech trees, straw, and potato leaves have become important raw materials for the pulp industry (**17**; 14.3.41). It is stated that Germany's largest combine, Waldhof in Mannheim, produces pulp made entirely from Beech wood at its mills at Kelheim on the Danube (**5**; 22.5.41). Pulp mills in Finland controlled by this combine have been completely destroyed and compensation was paid by the Finnish Government by granting the combine a long-term credit at a low rate of interest (**8**; 22.5.41). In conjunction with French companies, the Waldhof combine intends to erect a pulp plant at Bordeaux, in order to exploit the timber resources south of that town (**5**; 24.5.41). The combine distributed during the last five years a dividend of 7 per cent. on its share capital (**8**; 26.5.41).

Japan. Japanese lumber interests in the South Seas are concentrated in the Philippines and in Borneo, where the Lauan (*Shorea* spp.) trade is largely under Japanese control, while British capital practically monopolizes the Teak industry in Thailand and elsewhere. Japanese forestry investments in the Philippines are estimated at a fifth of the total investment in forestry there, and, in spite of difficulties, Japanese firms are striving to maintain their felling activities, for, if they reduced these below the designated quotas, the Philippine Government would confiscate their holdings. Of the fifteen Japanese firms engaged in the South Seas lumber industry, three are outstanding. The Philippine Timber Export Company, established in 1914, holds a forest concession of 480 square miles, and the South Seas Timber Company, a subsidiary of the Oriental Development Company, originally had a concession near Tarakan. This the Netherlands Indies Government revoked on account of its proximity to the oil fields and granted instead a concession of 50,000 ha. at Sankulirang. The third Japanese company of importance is Nissan Agriculture and Forests, with concessions in Dutch Borneo (**12**; 29.5.41).

Latin America. In recent years some approach to industrial lumbering has been made in Brazil, Chile, Mexico, and Argentine, chiefly in areas where softwood resources are found, and in Chile and Brazil these efforts have resulted in replacing the imported timber by the native product. As a result of the increase in local production there is now a considerable timber trade amongst the South American countries. Chile has evolved from an importing into an exporting country and since 1931 exports have been continuously increasing. Chilean woods have found markets in Argentine, Peru, Bolivia, and, prior to the war, in Germany, and smaller amounts have been exported to Ecuador and Uruguay, and even to Japan and Spain. Brazil's best markets are in Argentine and Uruguay. Other countries which have imported Brazilian woods are the United States, Portugal, Italy, Spain, Germany, and Great Britain, and more recently contacts were made with South Africa. Argentine, despite considerable resources of her own, is the most important timber-importing market in South America. Mexico has made considerable progress in lumbering, and exports to that country face a prospect of gradual extinction. Cuba is an importing country, and Uruguay has practically no timber resources of her own. Paraguay, with considerable forest resources but primitive exploitation

methods, sends all her surplus woods to Argentine and Uruguay, while Peru's great forest resources in the Amazon Basin are not economically available for mass exploitation (**11**; April, 1941).

New Zealand. A serious shortage of labour confronts the sawmill industry in the Rotorua District. So scarce are skilled workmen that, in one mill at least, mill-hands are dividing their time between felling and cutting, with a result that the machinery has to be idle for half the day. Though the minimum wage is 19*s*. a day, many workmen are receiving 25*s*. Benchmen easily earn £9 weekly for a 40- to 44-hour week. None of the 20 mills in the Taupo-Ruatahuna-Mamaku District is fully staffed (**6**; 16.1.41).

Norway. Timber prices for industry were fixed early this year in the hope of avoiding some of last year's delay in the felling of timber for industry. All agreements for the sale of timber must be submitted to a central office of forestry for ratification; this office also decides on the final allocation of the timber. At present, however, cutting and preparing of timber for fuel is so urgent and behind schedule, owing partly to shortage of labour, that all efforts must be concentrated on procuring a sufficiency of fuel. Until that is done, no timber cutting for industry will be allowed (**1**; 23.7.41).

Slovakia. Slovak representatives of the Forestry and Timber Board discussed in Berlin the measure of German assistance in the industrialization and modernization of the Slovak timber industry. Slovakia's yearly production of timber is about 5 million cu.m., of which some 3 millions are exported as raw materials or manufactured goods. The Timber Association comprises 183 sawmills, with a capacity of 1·9 million cu.m. of round timber. They are working to 75 or 80 per cent. of capacity, and in 1940 employed 7,717 men (**9**; 28.5.41).

Spain.—From an article by F. Ferrari Billoch on the forest resources of Spain: It is estimated that the increment of Spanish forests amounts to only half a million cu.m. per annum, while with the proposed development of the paper-pulp and wood-wool industries, internal consumption will reach 3¼ million cu.m. in the near future. The afforestation of one million ha. with fast-growing species is considered an urgent necessity (**10**; 10.6.41).

Uruguay. The forest area of Uruguay is given at 585,900 ha., representing approximately 3 per cent. of the land area. 534,200 ha. are said to be natural forests and the remainder plantations. A national commission encourages tree planting among the rural population. It is thought, however, that the State should take a more active part in afforestation (**14**; 7.4.41).

U.S.S.R. On the initiative of the Soviet Directorate of Perfumery, Confectionery, and Pharmaceutical Industries, Lemon Eucalypt (*E. citriodora*) was imported two years ago from Australia. 120 ha. will be planted with this tree in 1941. At present, Patchouli, Violets, and Jasmine are the chief sources of aromatic oils (**2**; 25.3.41).